

University of Saint Joseph
Athletic Field Renovations
West Hartford, Connecticut

Stormwater Management Report

February 20, 2019
Project # 19014



Submitted by:
SMRT Architects and Engineers
877.700.7678
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1 PROJECT NARRATIVE

1.1 Introduction

The project consists of the construction of a new multi-sport synthetic turf field and upgraded field lighting. Athletics are an integral component of student life at Saint Joseph's, and the University is looking to enhance and upgrade its current amenities. The proposed project development area is located at the northwest end of campus, within the footprint of the existing track and field. The track and natural grass field are in poor condition, and the University intends to remove these amenities and replace them with one new, lighted, multi-purpose synthetic turf field to support the University's field hockey, soccer, and lacrosse programs.

The construction of the new synthetic turf field will occur entirely within previously disturbed areas. There will be no impact to surrounding trees, vegetation, or parking areas, and there will be no significant changes to actual land uses on the site. The project will result in alterations to existing cover conditions within the project area. This report describes the impact of the cover changes on surface runoff quantity and quality, and describes measures that have been incorporated into the design to ensure that there will be no detrimental impacts to downstream receiving waters.

In addition to permanent stormwater management measures, a comprehensive array of temporary soil erosion and sediment control measures (SESC) will be installed to serve the construction phase of the project. Disturbed areas of the site will be covered and stabilized as soon as practical to avoid exposure of bare soil. Sediment transport will be minimized through the use of barriers, diversions and other Best Management Practices. The SESC measures will be inspected and maintained throughout construction, and until final stabilization is achieved across the site.

As a result of these measures, the development is not expected to have any significant impacts on downstream water quality or quantity.

1.2 Site Location

The University of Saint Joseph is located at 1678 Asylum Avenue in West Hartford, CT and is bounded by Albany Avenue to the north, Steele Road to the east, and Trout Brook Drive to the west. The project development area is located at the northwest end of the campus, due west of the O'Connell Athletic Center. Six (6) existing tennis courts are located to the north of the development area, an asphalt walkway lines the eastern edge, and parking areas are located to the south. The development area currently consists of a 400-meter synthetic surfaced running track, and a natural grass multi-sport athletic field.

See Figure 1 for project location on USGS Topographic Map.

1.3 Site Topography

The existing natural grass field is crowned with a one and a half to two (1.5-2.0) percent pitch, draining east and west towards the track (center of field elevation: 105.75). To the north of the

track and field, the topography slopes upwards approximately six (6) feet to the tennis courts (elevation: 112.00). To the east of the track and field the grade pitches down into a swale and then upwards three feet to an asphalt walkway/access drive (elevation: 106.00). To the south and west, the topography slopes down approximately three to four feet into the woodlands and wetland pockets (elevation 100.00).

1.4 Receiving Waters

The Saint Joseph's campus generally drains from the northeast to southwest. The developed area is surrounded by several wetlands that drain towards the southwest end of campus to more wetlands. The runoff eventually drains to Trout Brook which is part of the Subregional Basin 4403. The Town of West Hartford is included in the "Connecticut" major watershed area.

The analysis described in this report focuses on the area disturbed by the athletic improvements and will demonstrate that the peak runoff rates to the wetlands are reduced under all design storm conditions due to the installation of the stone base underneath the synthetic turf field and the removal of impervious area (track surfacing and sidewalk areas).

1.5 Soils Conditions

The Natural Resources Conservation Service (NRCS) Web Soil Survey identifies the following predominant soil type within the disturbed area:

- Udorthents Smoothed– This designation is reflective of disturbed conditions where few, if any remnants exist of the natural soil horizons. Erosion factors for use in the Universal Soil Loss Equation are $K=0.28$, and $T=3$. Udorthents soils are classified as Hydrologic Soil Group C.

Geotechnical investigations indicate that the site is at the interface of moraine deposits (medium compact sand, silt, and gravel) and glacial lake deposits (stiff silt and clay). The water table is within five (5) feet of finish grade, with all soils three (3) feet below grade being fully saturated from capillary water. The complete subsurface exploration program and geotechnical engineering evaluation report by Welti Geotechnical, P.C. is included as part of this application for reference.

1.6 Historic Flooding

The project area is not identified within a flood area on the FEMA Firm Map No. 09003C0361F effective 09/26/2008. A copy of the FEMA map is included within this report.

1.7 Alterations to Natural Drainageways

The new project area drains to an existing piped system. The proposed project replicates these drainageways.

1.8 Methodology and Modeling Assumptions

Runoff and routing calculations have been performed for the watershed areas impacted by the project in both the pre-development and post-development conditions using HydroCAD® software. Time of concentration and runoff curve number calculations have been determined using the method described in NRCS Technical Release 55 – Urban Hydrology for Small Watersheds (TR-55). Time of concentration calculations have been amended where the value given by the TR-55 method is less than five minutes. In these cases a standard minimum value of five minutes has been used to keep this parameter within the acceptable working range of the model.

Design rainfall events have been modeled using the SCS Type III hydrograph for 24-hour duration storms. The rainfall depth for each return period is taken from *Table 7-2 – 2004 Connecticut Stormwater Quality Manual and ConnDOT Drainage Manual (2004)*. The rainfall depth values for standard design storm frequencies are given in the table below.

24-Hour Rainfall Depths for Hartford County, Connecticut at Design Storm Frequencies					
<i>Table 7-2 – 2004 Connecticut Stormwater Quality Manual</i>					
Frequency	1-Year	2-Year	10-Year	25-Year	100-Year
Rainfall Depth(in)	2.6	3.2	4.7	5.5	6.9

2 STORMWATER ANALYSIS

2.1 Pre-Development Conditions

The pre-development condition has been analyzed at one design point. Design Point 1 (DP-1) is a catch basin at the wetland to the south of the project site. This catch basin has a 36" inlet and 36" outlet which is directed towards the southwestern end of the campus. The stormwater eventually enters Trout Brook to the southwest of campus.

The pre-development conditions analysis has been broken out into four (4) subcatchment areas:

- SC-A includes the natural grass field and a majority of the track running lanes and runways. Stormwater from this area drains to the collector pipes along the east and west edge of the field and connect into the large catch basin in the south D-zone. This large catch basin outlets via 36" RCP to the catch basin in the south wetland.
- SC-B includes the south D-zone area, the perimeter lawn area, and the wetlands to the south. Stormwater flows overland to the catch basin in the south wetland.
- SC-C includes the existing sidewalks and lawn area to the east of the running track. This area drains to several yard drains that connect to the large catch basin in the south D-zone and outlets via 36" RCP to the catch basin in the south wetland.
- SC-D includes the lawn area to the north of the track. Stormwater is collected by a series of yard drains, which connect to the field header pipe. The header pipe connects to the large catch basin in the south D-zone and outlets via 36" RCP to the catch basin in the south wetland.

Detailed descriptions of the subcatchment areas can be found in the HydroCAD runoff reports and on the pre-development watershed plan.

2.2 Post-Development Conditions

The same total drainage area and design point were analyzed in the post-development condition. The major changes in coverage are the construction of a new synthetic turf field and the removal of the existing running track and adjacent sidewalk. Approximately 30,500 sf of impervious area is being removed as a result of the proposed project.

The synthetic turf field is included in the model as Direct Entry (CN 98) since there is no depression storage, or evapotranspiration loss of rainfall that lands on the structure. Rainfall will drain directly through the surface of the field to the underlying base layer of highly porous crushed stone. The stone base will act as a large storage reservoir, detaining rainfall that enters the structure. It should be noted that the stone layer extends 6 inches beneath the field underdrain piping, providing significant storage volume prior to *any* stormwater discharging to the piped drainage system. The stone base layer is proposed to be the reclaimed/recycled track base stone material. If there is an inadequate volume of reclaimed materials for re-use, borrow crushed stone will be installed. This material is modeled as a pond with 30% voids.

Based on the geotechnical investigation, the soils are very saturated and will not infiltrate into the subsoils underneath the field. Therefore, no exfiltration has been used in the HydroCAD model.

The underdrains are modeled as multiple vertical orifices that discharge to the larger collector pipes that collect and convey stormwater around the perimeter of the proposed turf field. The header pipe system will convey the rainfall to the existing structure to the south of the field.

Similar to the pre-development analysis, the post-development conditions analysis has been broken out into four (4) subcatchment areas:

- SC-A includes the synthetic turf field. Stormwater from this area will drain vertically to the panel drains which connect into the collector pipes along the east and west edge of the field. The collector pipe connects into the large catch basin in the south D-zone. This large catch basin outlets via 36" RCP to the catch basin in the south wetland.
- SC-B includes the south D-zone area that is to remain and the perimeter lawn area and wetlands to the south. Stormwater flows overland to the catch basin in the south wetland.
- SC-C includes the existing sidewalks and lawn area to remain to the east of the synthetic turf field. This area drains to several yard drains that connect to the large catch basin in the south D-zone and outlets via 36" RCP to the catch basin in the south wetland.
- SC-D includes the lawn area to the north of the track. Stormwater is collected by a series of yard drains, which connect to the field header pipe. The header pipe connects to the large catch basin in the south D-zone and outlets via 36" RCP to the catch basin in the south wetland.

Detailed descriptions of the subcatchment areas can be found in the HydroCAD runoff reports and on the post-development watershed plan. The runoff and routing analysis shows that there will be no increase in peak runoff from the proposed development under any design storm conditions.

Refer to the tables below for the peak flow and runoff volume comparisons in the 1-year, 2-year, 10-year, 25-year and 100-year storms.

Table 1 - Development Runoff Summary- Peak Flow (cfs)					
Design Point-1	Design Storm Event Return Period				
	1-Year	2-Year	10-Year	25-Year	100-Year
Pre-Dev	7.39	10.52	18.76	23.26	31.17
Post-Dev	4.20	6.03	11.48	15.31	21.58
Change	-3.19	-4.49	-7.28	-7.95	-9.59

Table 2 - Development Runoff Summary- Volume (acre-ft)					
Design Point-1	Design Storm Event Return Period				
	1-Year	2-Year	10-Year	25-Year	100-Year
Pre-Dev	0.558	0.788	1.409	1.757	2.381
Post-Dev	0.422	0.672	1.326	1.686	2.325
Change	-0.136	-0.116	-0.08	-0.071	-0.056

2.3 Best Management Practices (BMPs) / State of Connecticut Requirements

No specific stormwater BMPs are proposed to be constructed as part of this project because there is no increase in impervious area. The majority of the running track and adjacent sidewalk are proposed to be removed, which results in a reduction of approximately 30,500 sf of impervious area from the pre- to post-development condition.

State Requirements:

- Section 7.4 Pollutant Reduction
 - There is no added impervious area to the proposed project; therefore, a specific BMP for the treatment of the water quality volume is not required.
 - Installation of the synthetic turf field eliminates the need for fertilizers and other legal lawn treatments; therefore, reducing the amount of these materials which can have a detrimental effect on the wetland habitat.
 - The field project proposes no vehicular use, so oil spills and other hazardous materials typical of parking lots/driveways will not be an issue.
- Section 7.5 Groundwater Recharge
 - Due to the highly saturated soils and high groundwater level, provisions to address the groundwater recharge volume are not feasible.
- Section 7.6 Peak Flow Control
 - Stream Channel Protection
 - The 2-year, 24-hour post-development peak flow rate will be reduced to less than the 1-year, 24-hour pre-development peak flow rate.
 - 1-year pre-development flow rate = 7.39 cfs
 - 2-year post-development flow rate = 6.03 cfs
 - Conveyance Protection
 - The project's system is designed to the 10-year, 24-hour storm.
 - Peak Runoff Attenuation
 - The post-development peak flows will not result in any significant increase in the peak runoff from the site during design storm events of 2-year, 10-year, 25-year, and 100-year return periods.
 - Emergency Outlet Sizing
 - There are no proposed changes to the downstream outlets and the 100-year peak flow rates are being reduced; therefore, there should be no erosion at the existing outlets.

3 CONCLUSIONS

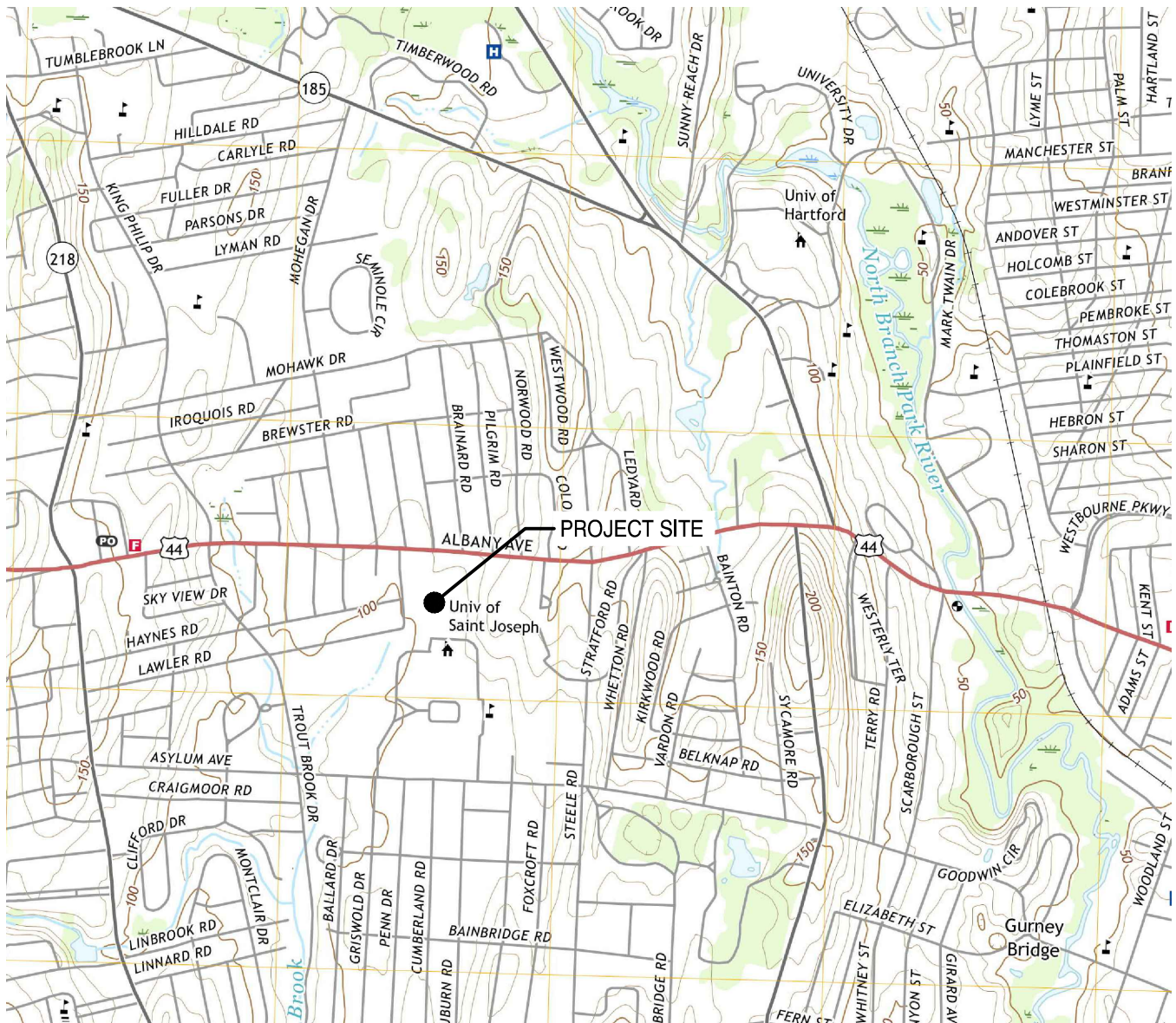
The runoff and routing calculations demonstrate that the development will not result in any increase in the peak runoff from the site during design storm events of the 1-year, 2-year, 10-year, 25-year and 100-year return periods. Due to the installation of the large porous stone reservoir underneath the field, the project will be able to store runoff beneath the field before outletting from the system. Also, with the installation of synthetic turf in lieu of natural grass, the project will eliminate the need for fertilizers and other legal lawn treatments. Therefore, the project will not result in any adverse impact on the downstream wetlands or watershed.

4 REFERENCES

- CT Stormwater Manual (2004 and as amended)
- Connecticut Guidelines for Soil Erosion and Sediment Control (2002)
- NRCS Technical Release 378
- NRCS Web Soil Survey
- Geotechnical Study for Synthetic Turf Field at University of Saint Joseph, 1678 Asylum Avenue, West Hartford, CT by Welti Geotechnical, P.C. dated January 25, 2019

University of Saint Joseph – Athletic Field Renovations
Stormwater Management Report

Figures



SMRT

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University of Saint Joseph
Athletic Field Renovations
West Hartford, Connecticut

SUBJECT:

USGS TOPOGRAPHIC MAP

HARTFORD NORTH QUADRANGLE 2018 NORTH



REF. SHEET:	-	SCALE:	1"=2000'-0"
PROJECT MANAGER:	RFW		
A/E OF RECORD:	MAF		
CAD FILE:	19014-TOPO MAP		
PROJECT NO:	19014		
DATE:	2-20-19		

SKETCH No.

FIG. 1

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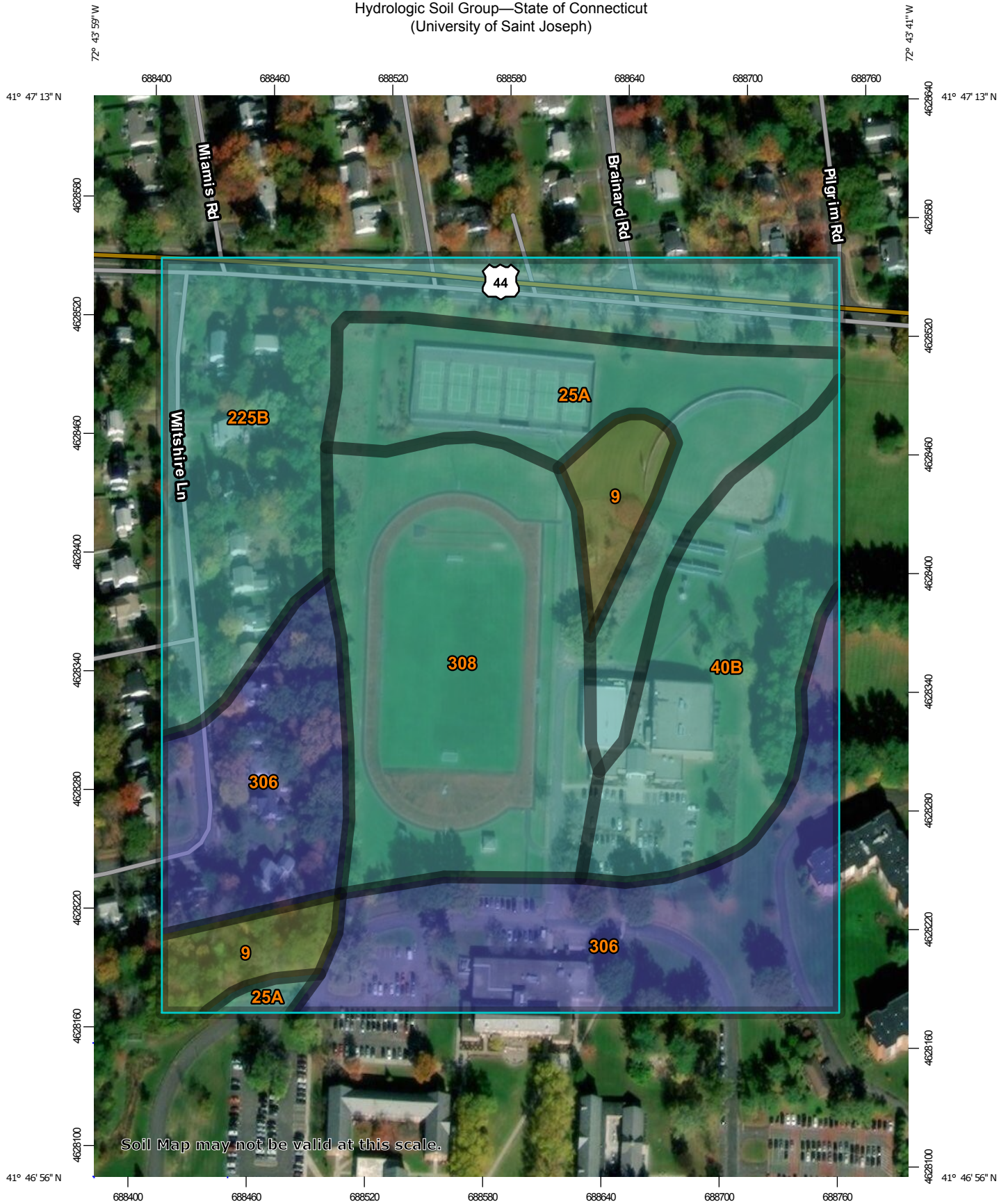
Soils Information

Appendix A

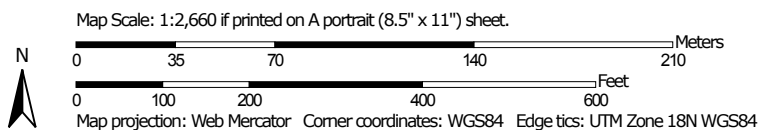
CONTENTS:

1. NRCS Hydrologic Soil Group Map
2. Geotechnical Study for Synthetic Turf Field at University of Saint Joseph, 1678 Asylum Avenue, West Hartford, CT by Welte Geotechnical, P.C. dated January 25, 2019

Hydrologic Soil Group—State of Connecticut (University of Saint Joseph)



Soil Map may not be valid at this scale.



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

1/15/2019
Page 1 of 4

MAP LEGEND

Area of Interest (AOI)









 Area of Interest (AOI)

Soils

Soil Rating Polygons





 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines


 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points

 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available


Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut
Survey Area Data: Version 18, Dec 6, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 27, 2016—Oct 30, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
9	Scitico, Shaker, and Maybid soils	C/D	1.6	5.1%
25A	Brancroft silt loam, 0 to 3 percent slopes	C	4.5	13.9%
40B	Ludlow silt loam, 3 to 8 percent slopes	C	4.5	13.7%
225B	Brancroft-Urban land complex, 0 to 8 percent slopes	C	6.9	21.2%
306	Udorthents-Urban land complex	B	8.2	25.3%
308	Udorthents, smoothed	C	6.8	20.8%
Totals for Area of Interest			32.6	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

WELTI GEOTECHNICAL, P.C.

GEOTECHNICAL ENGINEERING

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January 25, 2019

Mr. Richard F. Webb, Senior Principal
SMRT
One Dundee Park, Suite 4
Andover, MA 01810

**Re: Geotechnical Study for Synthetic Turf Field at University at University of Saint Joseph,
1678 Asylum Avenue, West Hartford, CT**

Dear Dick:

1.0 Herewith are the data from the test borings taken at the above site. Five borings were drilled to a depth of five feet at the existing field. The borings were sampled continuously. The boring locations are shown on the attached plan. *The borings were drilled and sampling was conducted by this firm solely to obtain indications of subsurface conditions as part of a geotechnical exploration program. No services were performed to evaluate subsurface environmental conditions.* Grain size gradation and water content tests were performed on four soil samples taken from the field borings and two laboratory permeability test were performed on two representative soil samples. The results of the laboratory tests are included with the borings logs.

2.0 The **Subject Project** is a proposed new synthetic turf surface over the existing natural turf field. The existing running track will be removed and the new field may be moved closer to the tennis courts. A site layout and grading plan was not available at the time of this report.

3.0 Geologically the site is at the interface of the moraine deposits and the glacial lake deposits. The moraine deposits consist medium compact sandy silt with little gravel. The lake deposits consist primarily of medium stiff silt with little clay. There are shallow fills atop the natural deposits.

3.1 The **Soils Cross Sections** from the test borings is generally as follows:

Topsoil to 8" to 12"

Locally; fine SAND, little to some Silt to 1.5 to 2 feet, medium compact

SILT, trace to little fine Sand and Clay, trace Gravel to 5+ feet, medium stiff/medium compact

3.2 The **Water Table** was not evident on boring completion, but water contents of samples below 3 feet are at or close to saturation. It should be assumed that the water table will within 5 feet of grade and that the soil 2 feet above the water table would be saturated from capillary water.

4.0 The general criteria for the layers directly under synthetic fields are usually part of a design build section. Apart from this section the sub grades must be capable of supporting the construction equipment without rutting. A second requirement would be a total section (including synthetic field section) of least 18" of non-frost susceptible soils. Based on the grain size gradation tests and inspection of the soil samples, the soils at the subgrade below the topsoil have silt contents ranging from 30 to 80%. These soils would not be considered as non frost susceptible.

4.1 Controlled fills for frost protection should conform to the following or be with 3/4" crushed stone (CTDOT Form 817, M.01.01, No.6 Stone):

Percent Passing	Sieve Size
100	1.5"
90 - 100	1"
75 - 100	3/4"
10 - 35	1/4"
3 - 12	No. 100
0 - 5	No 200

4.2 The **initial step at the subject site** would be stripping the topsoil. The excavations should be made with a small bulldozer or excavator with smooth bucket to minimize disturbance to the subgrade soils. If the sub grades can be proof rolled without significant rutting or movements, the granular base would be placed over the stripped subgrade and compacted to 95+ % of modified optimum density (ASTM 1557D). The removal of the track may provide some granular material for part of the 18" of fill. If the sub grades are wet or unstable, proof compaction should be avoided or halted, if already initiated. The initial layer of material should be with a minimum 12" layer of 3/4" (No. 6 Stone) placed over a stabilization fabric (Mirafi HP 570 or equal). The working surface above the crushed stone should conform to the gradation in section 4.1. The total depth of crushed stone and controlled fill to provide a stable subgrade for heavy equipment would be at least 18". No compaction is required on the stone layer. The controlled fill should be rolled initially with 1 or 2 passes of a vibratory roller. If there is any weaving, the compaction should be solely with static rolling.

5.0 This report has been prepared for specific application to the subject project in accordance with generally accepted soil and foundation engineering practices. No other warranty, express or implied,

is made. In the event that any changes in the nature, design and location of structures are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing.

The analyses and recommendations submitted in this report are based in part upon data obtained from referenced explorations. The extent of variations between explorations may not become evident until construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations of this report.

Welti Geotechnical, P.C., should perform a general review of the final design and specifications in order that geotechnical design recommendations may be properly interpreted and implemented as they were intended.

If you have any questions please call me.

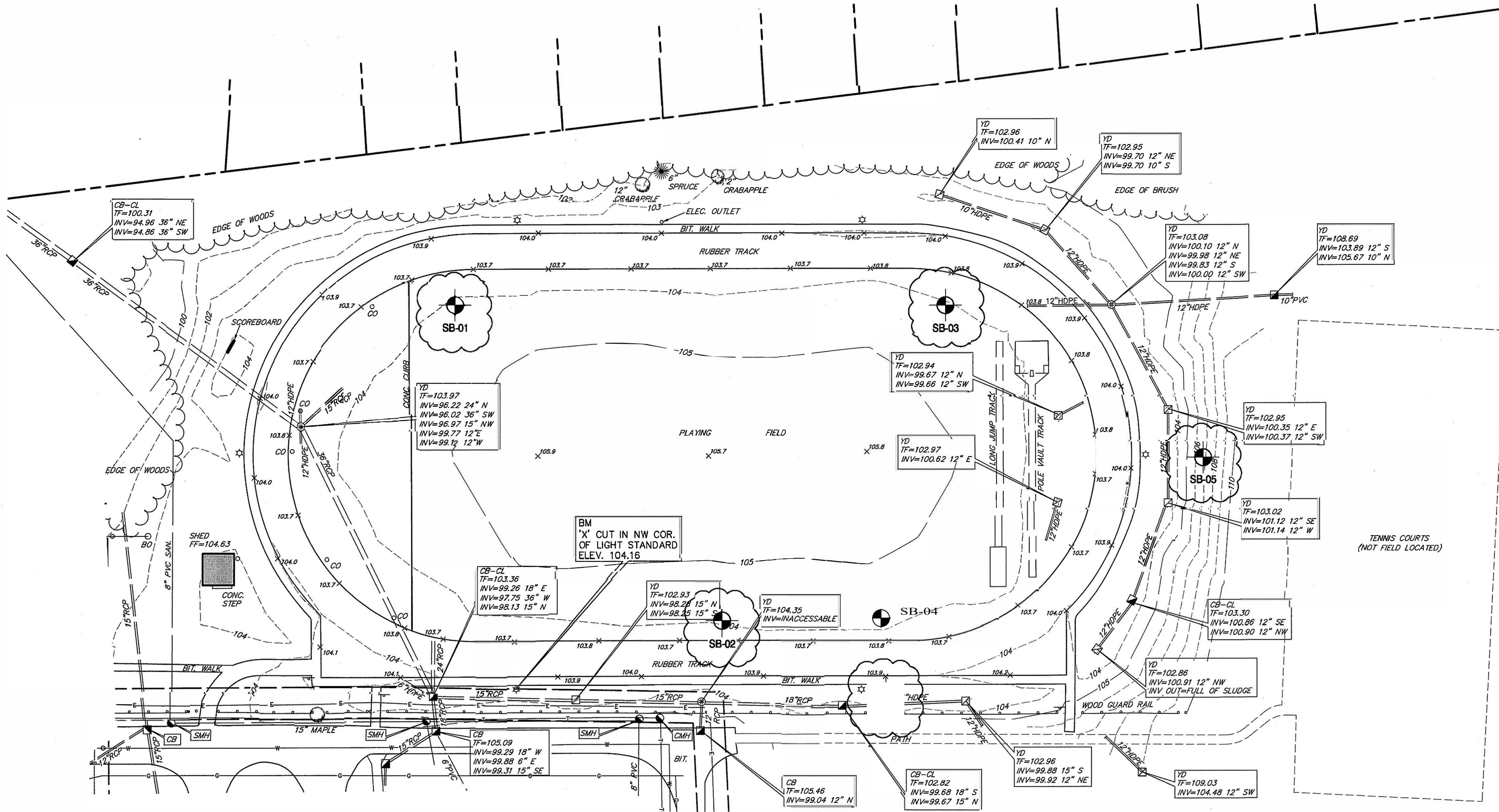
Very truly yours,

A handwritten signature in cursive script, appearing to read "Max Welti".

Max Welti, P.E.
President, Welti Geotechnical, P.C.

A handwritten signature in cursive script, appearing to read "Clarence Welti".

Clarence Welti, PhD, P.E.
Vice President



LEGEND

---	PROPERTY LINE
---	WATER LINE
o	WATER GATE
o	HYDRANT
o BO	BLOW OFF VALVE
o	MANHOLE
---	GAS LINE
---	ELECTRICAL LINE
---	TELEPHONE/COMMUNICATION LINE
■	CATCH BASIN
□	YARD DRAINS
o CO	CLEAN OUT
x 101.3	SPOT ELEVATION
+	SIGN

THIS DRAWING HAS BEEN PREPARED BASED, IN PART, ON INFORMATION PROVIDED BY OTHERS RELATING TO THE LOCATION OF UNDERGROUND SERVICES. WE CAN NOT VERIFY THE ACCURACY OF THIS INFORMATION AND SHALL NOT BE HELD RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY BE INCORPORATED HEREIN AS A RESULT. INDICATED UNDERGROUND UTILITIES ARE BASED ON AVAILABLE DATA. THE LOCATIONS ARE APPROXIMATE AND ALL UTILITIES MAY NOT BE SHOWN. CALL "CALL B-4-U DIG" AT 1-800-922-4455 PRIOR TO ANY EXCAVATION.

REFERENCE MAP:
 "TOPOGRAPHIC SURVEY, PLAN PREPARED FOR SAINT JOSEPH COLLEGE, 1678 ASYLUM AVENUE, WEST HARTFORD, CONN." DATE: 10-19-2007, SCALE: 1"=40', BY: MEEHAN & GOODIN.

NOTES:

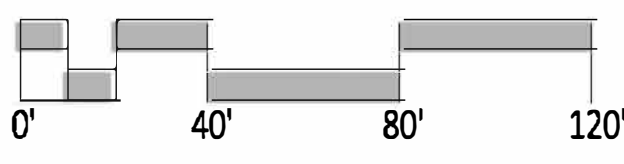
- THIS SURVEY HAS BEEN PREPARED PURSUANT TO THE REGULATIONS OF CONNECTICUT STATE AGENCIES SECTIONS 20-300b-1 THROUGH 20-300b-20 AND THE "STANDARDS FOR SURVEYS AND MAPS IN THE STATE OF CONNECTICUT" AS ADOPTED BY THE CONNECTICUT ASSOCIATION OF LAND SURVEYORS, INC. ON SEPTEMBER 26, 1996;
 TYPE OF SURVEY: IMPROVEMENT LOCATION SURVEY
 CLASS OF HORIZONTAL ACCURACY: A-2
 CLASS OF VERTICAL ACCURACY: V-2
 CLASS OF TOPOGRAPHIC ACCURACY: T-2
 SURFACE UTILITY ACCURACY: A-2
 UNDERGROUND UTILITY ACCURACY: D (COMPILED)
- THIS MAP IS VALID ONLY IF IT BEARS THE ORIGINAL SIGNATURE AND EMBOSSED SEAL OF THE UNDERSIGNED LAND SURVEYOR.

TO MY KNOWLEDGE AND BELIEF, THIS MAP IS SUBSTANTIALLY CORRECT AS NOTED HEREON.

SURVEYOR'S SIGNATURE _____ DATE _____ LICENSE NUMBER 14649



SITE BORING PLAN
 CLARENCE WELTI ASSOCIATES, INC.
 1/15/19



THE BOURGAINNE GROUP, INC.
 LAND SURVEYORS
 170 Pine Road
 Newington, Conn. 06111
 TEL (860) 666-0134
 FAX (860) 666-3830

Scale: 1"=40'

Date: 12-07-18

Drawn: CMS

Checked: AB

Revision

Date

TRACK & FIELD AREA

ON THE PROPERTY OF

UNIVERSITY OF SAINT JOSEPH

1678 ASYLUM AVENUE

WEST HARTFORD, CONNECTICUT

IMPROVEMENT LOCATION SURVEY

Sheet 1 of 1

07172-TRACK2.DWG 07172

01-06-18

CLARENCE WELTI ASSOC., INC. P.O. BOX 397 GLASTONBURY, CONN 06033				CLIENT		PROJECT NAME PROPOSED SYNTHETIC TURF FIELD				
						LOCATION UNIVERSITY OF SAINT JOSEPH 1678 ASYLUM AVENUE, WEST HARTFORD, CT				
		AUGER	CASING	SAMPLER	CORE BAR.	SMRT OFFSET	SURFACE ELEV.		HOLE NO. SB-1	
TYPE	HSA		SS			LINE & STA.	GROUND WATER OBSERVATIONS		START DATE	1/15/19
SIZE I.D.	3.75"		1.375"			N. COORDINATE	AT none FT. AFTER 0 HOURS			
HAMMER WT.			140lbs			E. COORDINATE	AT FT. AFTER HOURS		FINISH DATE	1/15/19
HAMMER FALL			30"							
DEPTH	SAMPLE			A	STRATUM DESCRIPTION + REMARKS					ELEV.
	NO.	BLOWS/6"	DEPTH							
0	1	3-3-3-5	0.0'-2.0'		TOPSOIL					0.66
					BR.FINE SAND, LITTLE SILT					1.0
					BR. SILT, TRACE CLAY					
	2	3-4-5-6	2.0'-4.0'		RED/BR.SILT, TRACE FINE SAND & GRAVEL					3.0
5	3	4-8	4.0'-5.0'		BOTTOM OF BORING @ 5.0'					5.0
10										
15										
20										
25										
30										
35										
LEGEND: COL. A: SAMPLE TYPE: D=DRY A=AUGER C=CORE U=UNDISTURBED PISTON S=SPLIT SPOON PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%						DRILLER: K. CHRISTIANA INSPECTOR:				
						SHEET 1 OF 1		HOLE NO. SB-1		

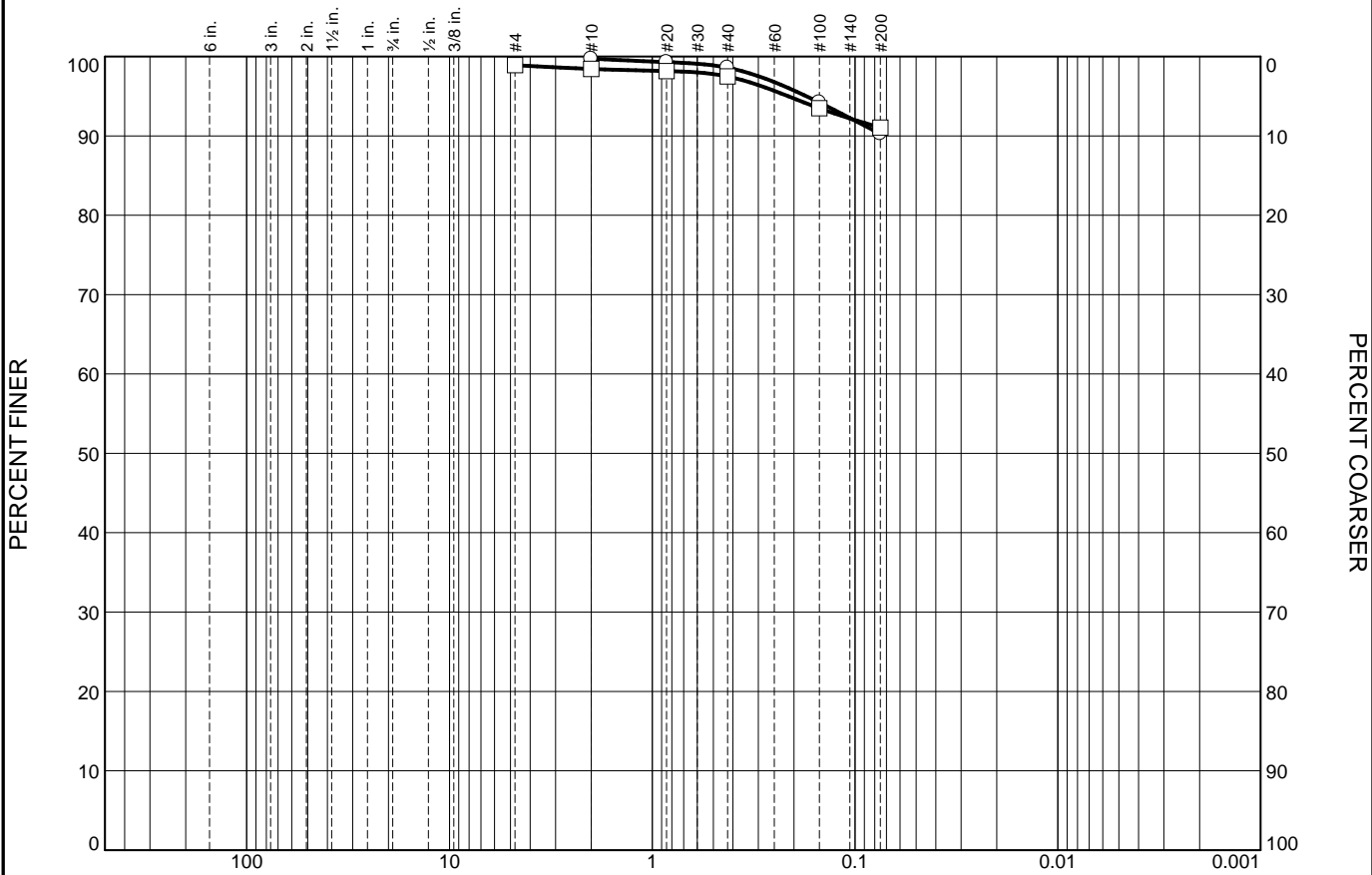
CLARENCE WELTI ASSOC., INC. P.O. BOX 397 GLASTONBURY, CONN 06033				CLIENT		PROJECT NAME PROPOSED SYNTHETIC TURF FIELD				
						LOCATION UNIVERSITY OF SAINT JOSEPH 1678 ASYLUM AVENUE, WEST HARTFORD, CT				
		AUGER	CASING	SAMPLER	CORE BAR.	SMRT OFFSET	SURFACE ELEV.		HOLE NO. SB-2	
TYPE	HSA		SS			LINE & STA.	GROUND WATER OBSERVATIONS		START DATE	1/15/19
SIZE I.D.	3.75"		1.375"			N. COORDINATE	AT none FT. AFTER 0 HOURS			
HAMMER WT.			140lbs			E. COORDINATE	AT FT. AFTER HOURS		FINISH DATE	1/15/19
HAMMER FALL			30"							
DEPTH	SAMPLE			A	STRATUM DESCRIPTION + REMARKS					ELEV.
	NO.	BLOWS/6"	DEPTH							
0	1	3-4-6-8	0.0'-2.0'		TOPSOIL					
					BR.FINE-MED.SAND, SOME SILT, TRACE GRAVEL					1.0
	2	5-7-8-8	2.0'-4.0'		GREY/BR.SILT, TRACE FINE SAND & CLAY					2.0
5	3	6-6	4.0'-5.0'		BOTTOM OF BORING @ 5.0'					5.0
10										
15										
20										
25										
30										
35										
LEGEND: COL. A: SAMPLE TYPE: D=DRY A=AUGER C=CORE U=UNDISTURBED PISTON S=SPLIT SPOON PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%						DRILLER: K. CHRISTIANA INSPECTOR:				
						SHEET 1 OF 1		HOLE NO. SB-2		

CLARENCE WELTI ASSOC., INC. P.O. BOX 397 GLASTONBURY, CONN 06033				CLIENT		PROJECT NAME PROPOSED SYNTHETIC TURF FIELD				
						LOCATION UNIVERSITY OF SAINT JOSEPH 1678 ASYLUM AVENUE, WEST HARTFORD, CT				
		AUGER	CASING	SAMPLER	CORE BAR.	SMRT OFFSET	SURFACE ELEV.		HOLE NO. SB-3	
TYPE	HSA		SS			LINE & STA.	GROUND WATER OBSERVATIONS		START DATE	1/15/19
SIZE I.D.	3.75"		1.375"			N. COORDINATE	AT none FT. AFTER 0 HOURS			
HAMMER WT.			140lbs			E. COORDINATE	AT FT. AFTER HOURS		FINISH DATE	1/15/19
HAMMER FALL			30"							
DEPTH	SAMPLE			A	STRATUM DESCRIPTION + REMARKS					ELEV.
	NO.	BLOWS/6"	DEPTH							
0	1	1-2-3-5	0.0'-2.0'		TOPSOIL					
					BR.FINE-MED.SAND, LITTLE SILT					1.0
					BR. SILT, SOME FINE-MED.SAND, TRACE CLAY					1.5
	2	4-6-6-7	2.0'-4.0'		RED/BR.SILT, LITTLE FINE-MED.SAND					3.0
					BR.SILT, TRACE FINE SAND & CLAY					4.0
5	3	6-8	4.0'-5.0'		BOTTOM OF BORING @ 5.0'					5.0
10										
15										
20										
25										
30										
35										
LEGEND: COL. A: SAMPLE TYPE: D=DRY A=AUGER C=CORE U=UNDISTURBED PISTON S=SPLIT SPOON PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%						DRILLER: K. CHRISTIANA INSPECTOR:				
						SHEET 1 OF 1		HOLE NO. SB-3		

CLARENCE WELTI ASSOC., INC. P.O. BOX 397 GLASTONBURY, CONN 06033				CLIENT		PROJECT NAME PROPOSED SYNTHETIC TURF FIELD				
						LOCATION UNIVERSITY OF SAINT JOSEPH 1678 ASYLUM AVENUE, WEST HARTFORD, CT				
		AUGER	CASING	SAMPLER	CORE BAR.	SMRT OFFSET	SURFACE ELEV.		HOLE NO. SB-4	
TYPE	HSA		SS			LINE & STA.	GROUND WATER OBSERVATIONS		START DATE 1/15/19	
SIZE I.D.	3.75"		1.375"			N. COORDINATE	AT none FT. AFTER 0 HOURS			
HAMMER WT.			140lbs			E. COORDINATE	AT FT. AFTER HOURS		FINISH DATE 1/15/19	
HAMMER FALL			30"							
DEPTH	SAMPLE			A	STRATUM DESCRIPTION + REMARKS					ELEV.
	NO.	BLOWS/6"	DEPTH							
0	1	2-3-4-5	0.0'-2.0'		TOPSOIL					0.66
					BR.SILT, LITTLE FINE SAND, TRACE CLAY & GRAVEL					1.5
	2	4-3-3-6	2.0'-4.0'		GREY/BR.SILT, TRACE FINE SAND, CLAY & GRAVEL					
5	3	4-3	4.0'-5.0'							5.0
					BOTTOM OF BORING @ 5.0'					
10										
15										
20										
25										
30										
35										
LEGEND: COL. A: SAMPLE TYPE: D=DRY A=AUGER C=CORE U=UNDISTURBED PISTON S=SPLIT SPOON PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%						DRILLER: K. CHRISTIANA INSPECTOR:				
						SHEET 1 OF 1		HOLE NO. SB-4		

CLARENCE WELTI ASSOC., INC. P.O. BOX 397 GLASTONBURY, CONN 06033				CLIENT		PROJECT NAME PROPOSED SYNTHETIC TURF FIELD				
						LOCATION UNIVERSITY OF SAINT JOSEPH 1678 ASYLUM AVENUE, WEST HARTFORD, CT				
		AUGER	CASING	SAMPLER	CORE BAR.	SMRT OFFSET	SURFACE ELEV.		HOLE NO. SB-5	
TYPE	HSA		SS			LINE & STA.	GROUND WATER OBSERVATIONS		START DATE	1/15/19
SIZE I.D.	3.75"		1.375"			N. COORDINATE	AT none FT. AFTER 0 HOURS			
HAMMER WT.			140lbs			E. COORDINATE	AT FT. AFTER HOURS		FINISH DATE	1/15/19
HAMMER FALL			30"							
DEPTH	SAMPLE			A	STRATUM DESCRIPTION + REMARKS					ELEV.
	NO.	BLOWS/6"	DEPTH							
0	1	2-1-3-4	0.0'-2.0'		TOPSOIL 0.25					
					GREY/BR.SILT, LITTLE FINE SAND, TRACE CLAY & GRAVEL					
	2	4-4-5-5	2.0'-4.0'							
	3	4-4	4.0'-5.0'							
5					BOTTOM OF BORING @ 5.0' 5.0					
10										
15										
20										
25										
30										
35										
LEGEND: COL. A: SAMPLE TYPE: D=DRY A=AUGER C=CORE U=UNDISTURBED PISTON S=SPLIT SPOON PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%						DRILLER: K. CHRISTIANA INSPECTOR:				
						SHEET 1 OF 1		HOLE NO. SB-5		

Particle Size Distribution Report



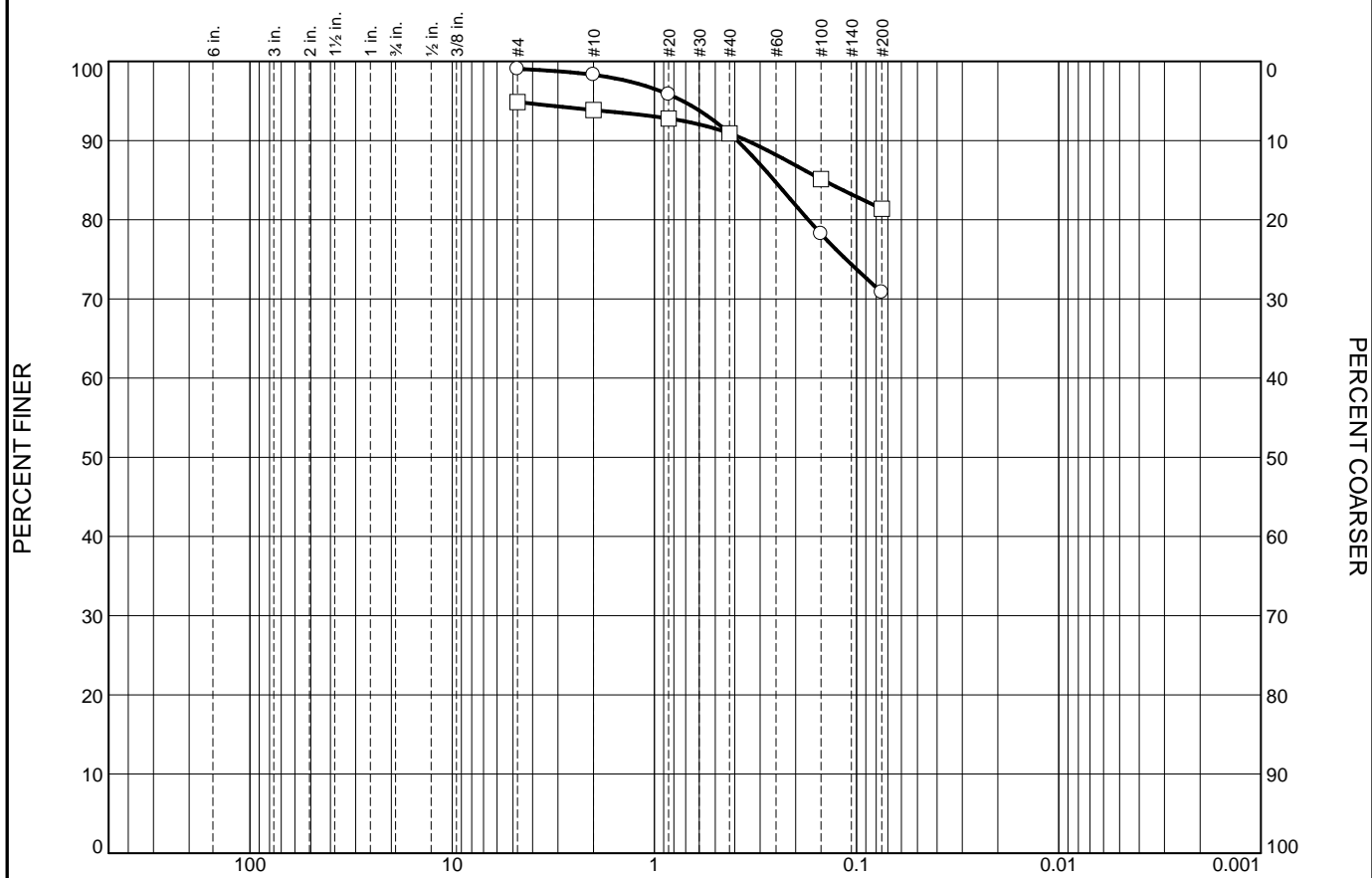
GRAIN SIZE - mm.										
	% +3"		% Gravel		% Sand			% Fines		
			Coarse	Fine	Coarse	Medium	Fine	Silt		Clay
<input type="radio"/>						1.1	8.3	90.3		
<input type="checkbox"/>					0.5	0.9	6.5	91.0		
<input type="checkbox"/>										
<input checked="" type="checkbox"/>	LL	PL	D85	D60	D50	D30	D15	D10	Cc	Cu
<input type="radio"/>										
<input type="checkbox"/>										
<input type="checkbox"/>										

Material Description							USCS	AASHTO
<input type="radio"/> <input checked="" type="checkbox"/> GREY/BR.SILT, TRACE FINE SAND & CLAY								

Project No. Project: PROPOSED SYNTHETIC TURF FIELD	Client: SMRT	Remarks: <input type="radio"/> water content = 21.5% <input type="checkbox"/> water content = 27.0%
<input type="radio"/> Source of Sample: SB-1 Depth: 1.0	<input type="checkbox"/> Source of Sample: SB-2 Depth: 2.0	
CLARENCE WELTI ASSOCIATES, INC.		

Figure

Particle Size Distribution Report



GRAIN SIZE - mm.											
% +3"			% Gravel		% Sand			% Fines			
			Coarse	Fine	Coarse	Medium	Fine	Silt		Clay	
<input type="radio"/>					0.8	7.4	20.1	70.8			
<input type="checkbox"/>					1.0	3.0	9.5	81.4			
<input checked="" type="checkbox"/>	LL	PL	D85	D60	D50	D30	D15	D10	Cc	Cu	
<input type="radio"/>			0.2559								
<input type="checkbox"/>			0.1466								

Material Description							USCS	AASHTO
<input type="radio"/>								
<input type="checkbox"/>								

Project No.	Client: SMRT	Remarks: <input type="radio"/> water content = 21.9% <input type="checkbox"/> water content = 23.2%
Project: PROPOSED SYNTHETIC TURF FIELD		
<input type="radio"/> Source of Sample: SB-3 Depth: 1.5		
<input type="checkbox"/> Source of Sample: SB-5 Depth: 2.0		
CLARENCE WELTI ASSOCIATES, INC.		Figure

Proposed Synthetic Surface Athletic Field
University of Saint Joseph
1678 Asylum Avenue, West Hartford, CT

Laboratory Permeability Test

Sample No.	Depth (feet/day)
SB-1, 2'-4'	<1.0
SB-3, 2'-4'	<1.0

University of Saint Joseph – Athletic Field Renovations
Stormwater Management Report

FEMA Flood Insurance Rate Map

Appendix B

National Flood Hazard Layer FIRMette



41°47'15.56"N



0 250 500 1,000 1,500 2,000 Feet 1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		Area of Minimal Flood Hazard Zone X
		Effective LOMRs
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
MAP PANELS		Digital Data Available
		No Digital Data Available
MAP PANELS		Unmapped



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 2/11/2019 at 3:22:54 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

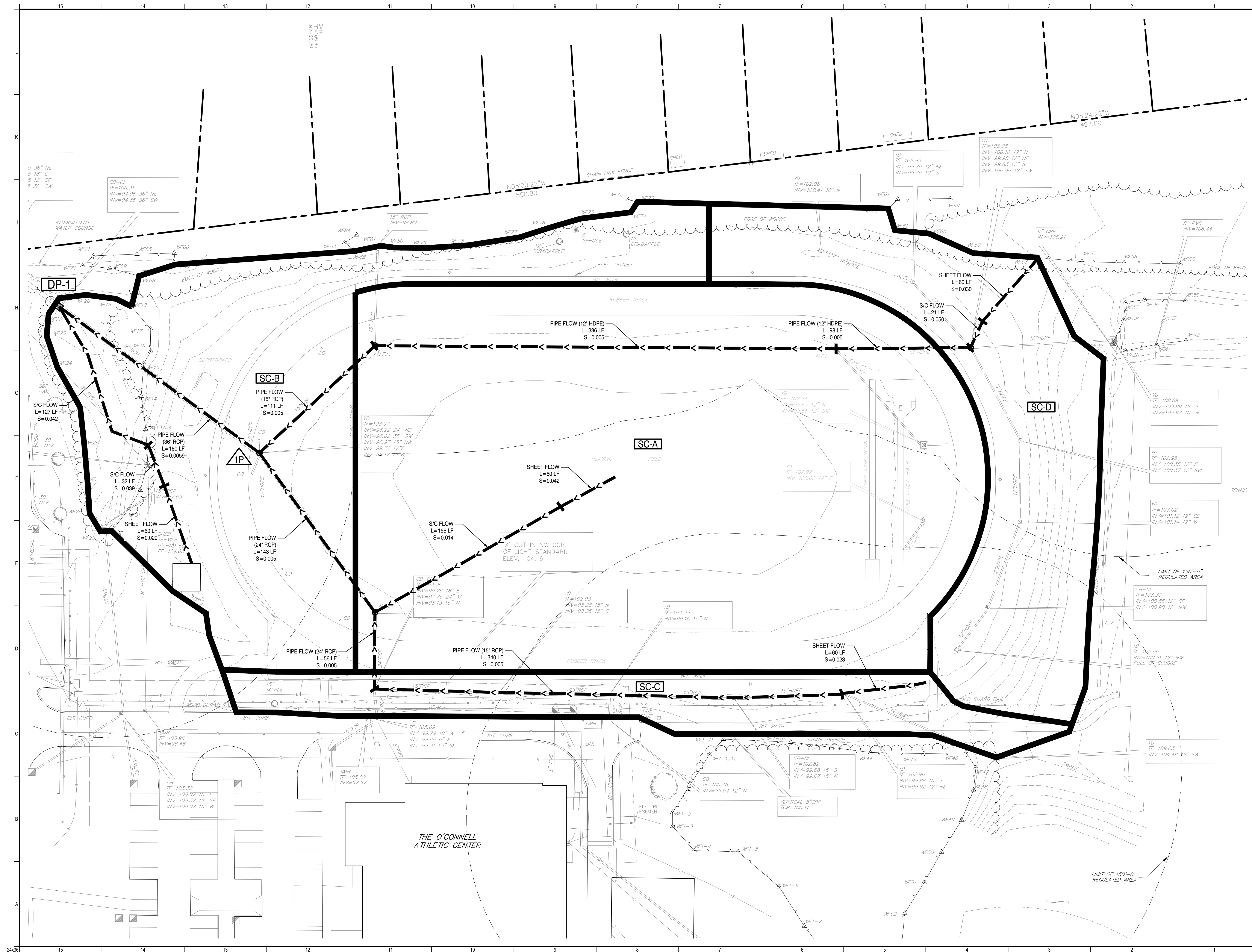
University of Saint Joseph – Athletic Field Renovations
Stormwater Management Report

Pre-Development Conditions Analysis

Appendix C

CONTENTS:

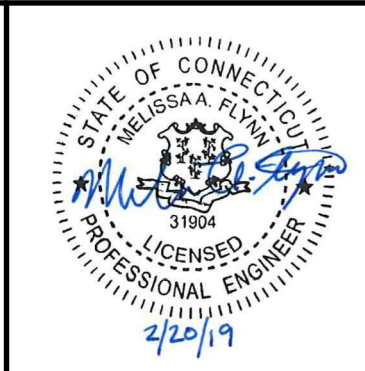
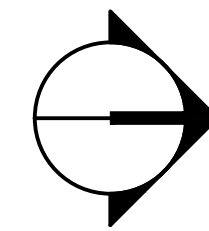
1. Pre-development Watershed Map
2. Pre-development HydroCAD Runoff and Routing Calculations



0	ISSUED FOR PERMITTING	02-20-19
REV	DESCRIPTION	DATE

ISSUED FOR PERMITTING
02-20-19

CURRENT ISSUE STATUS:



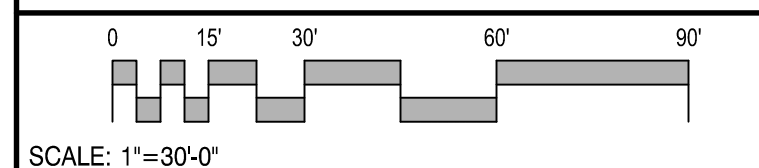
SMRT Architects and Engineers
200 Brickstone Square, Suite 303
Andover, Massachusetts 01810
1.877.700.7678
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UNIVERSITY OF SAINT JOSEPH
ATHLETIC FIELD RENOVATIONS

1678 ASYLUM AVE., W. HARTFORD, CT 06117

PRE-DEVELOPMENT
WATERSHED MAP

SHEET TITLE:



PROJECT MANAGER:	RFW	PROJECT NO:	19014
A/E OF RECORD:	MAF	<div style="text-align: center; font-size: 2em; font-weight: bold;">C-120</div>	<div style="text-align: right; font-size: 0.8em;">©COPYRIGHT 2019 SMART INC.</div>
JOB CAPTAIN:	-		
DRAWN BY:	MAF		
SMRT FILE:	C-120-19014.dwg		
		<div style="text-align: center;"> SHEET No. NOT FOR CONSTRUCTION </div>	

19014_PRE

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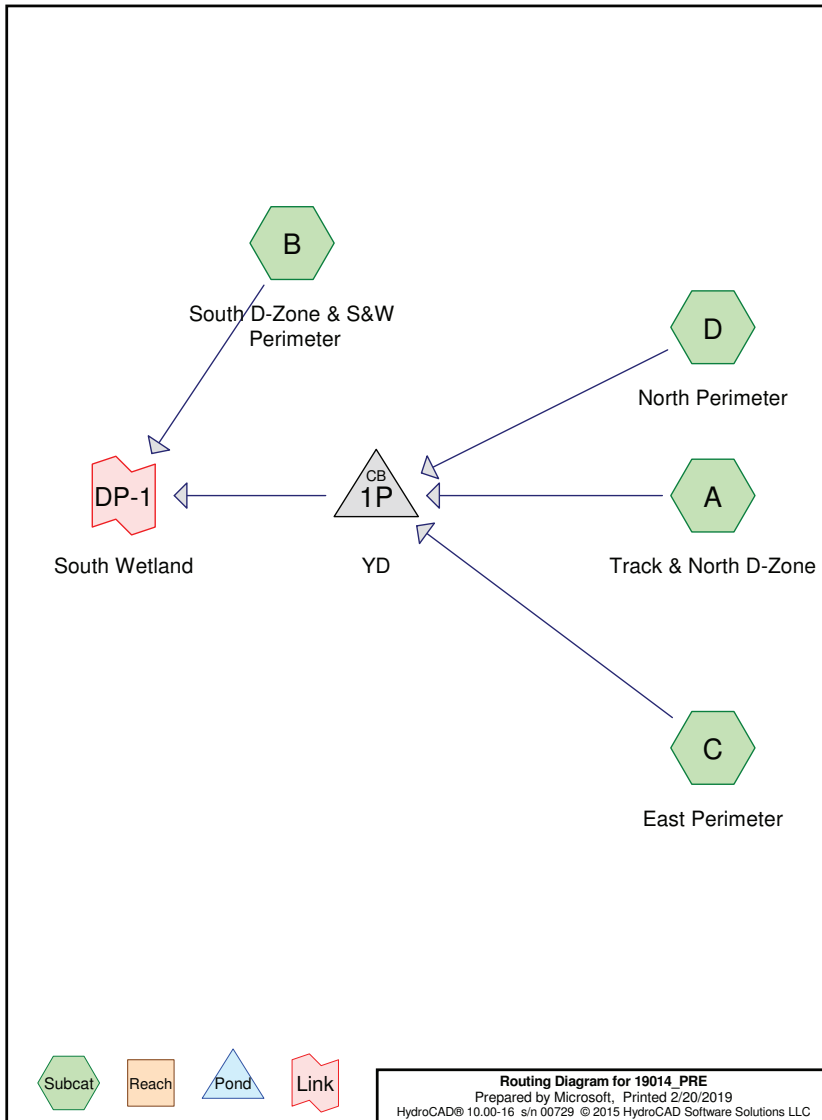
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Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
4.357	79	50-75% Grass cover, Fair, HSG C (A, B, C, D)
0.254	98	Asphalt Pavement (B, C, D)
0.009	98	Roof (B)
1.104	98	Running Track (A, B)
5.725	84	TOTAL AREA



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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
4.357	HSG C	A, B, C, D
0.000	HSG D	
1.367	Other	A, B, C, D
5.725		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	4.357	0.000	0.000	4.357	50-75% Grass cover, Fair	A, B, C, D
0.000	0.000	0.000	0.000	0.254	0.254	Asphalt Pavement	B, C, D
0.000	0.000	0.000	0.000	0.009	0.009	Roof	B
0.000	0.000	0.000	0.000	1.104	1.104	Running Track	A, B
0.000	0.000	4.357	0.000	1.367	5.725	TOTAL AREA	

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	A	0.00	0.00	143.0	0.0050	0.013	24.0	0.0	0.0
2	C	0.00	0.00	340.0	0.0050	0.013	15.0	0.0	0.0
3	C	0.00	0.00	56.0	0.0050	0.013	24.0	0.0	0.0
4	C	0.00	0.00	143.0	0.0050	0.013	24.0	0.0	0.0
5	D	0.00	0.00	98.0	0.0050	0.013	12.0	0.0	0.0
6	D	0.00	0.00	336.0	0.0050	0.013	12.0	0.0	0.0
7	D	0.00	0.00	336.0	0.0050	0.013	15.0	0.0	0.0
8	1P	96.02	94.96	180.0	0.0059	0.013	36.0	0.0	0.0

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Type III 24-hr 1-Year Storm Rainfall=2.60"

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Page 6

Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Track & North D-Zone Runoff Area=122,732 sf 21.87% Impervious Runoff Depth=1.13"
Flow Length=359' Tc=6.7 min CN=83 Runoff=3.61 cfs 0.266 af

Subcatchment B: South D-Zone & S&W Runoff Area=62,857 sf 40.29% Impervious Runoff Depth=1.40"
Flow Length=219' Tc=6.4 min CN=87 Runoff=2.33 cfs 0.168 af

Subcatchment C: East Perimeter Runoff Area=21,545 sf 22.41% Impervious Runoff Depth=1.13"
Flow Length=599' Tc=8.4 min CN=83 Runoff=0.60 cfs 0.047 af

Subcatchment D: North Perimeter Runoff Area=42,232 sf 6.09% Impervious Runoff Depth=0.96"
Flow Length=851' Tc=9.3 min CN=80 Runoff=0.94 cfs 0.077 af

Pond 1P: YD

Peak Elev=96.92' Inflow=5.08 cfs 0.390 af

36.0" Round Culvert n=0.013 L=180.0' S=0.0059 '/' Outflow=5.08 cfs 0.390 af

Link DP-1: South Wetland

Inflow=7.39 cfs 0.558 af

Primary=7.39 cfs 0.558 af

Total Runoff Area = 5.725 ac Runoff Volume = 0.558 af Average Runoff Depth = 1.17"**76.11% Pervious = 4.357 ac 23.89% Impervious = 1.367 ac**

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Type III 24-hr 1-Year Storm Rainfall=2.60"

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Summary for Subcatchment A: Track & North D-Zone

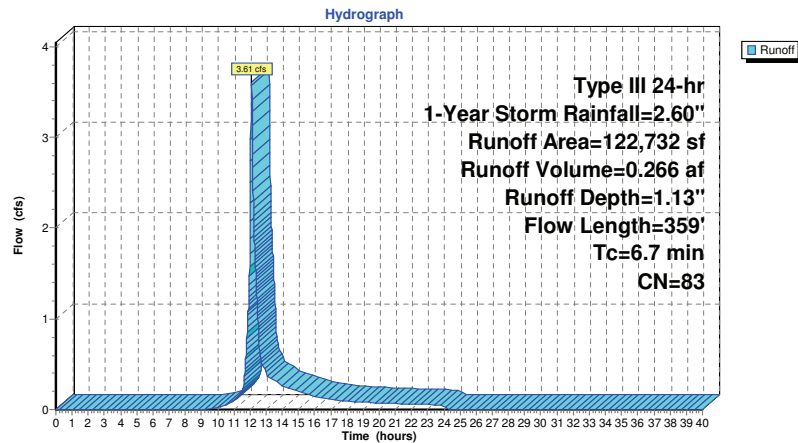
Runoff = 3.61 cfs @ 12.10 hrs, Volume= 0.266 af, Depth= 1.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Storm Rainfall=2.60"

Area (sf)	CN	Description
* 26,841	98	Running Track
95,891	79	50-75% Grass cover, Fair, HSG C
122,732	83	Weighted Average
95,891		78.13% Pervious Area
26,841		21.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	60	0.0420	0.21		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.4	156	0.0140	1.90		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	143	0.0050	5.09	16.00	Pipe Channel, Existing 24" RCP 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
6.7	359	Total			

Subcatchment A: Track & North D-Zone



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Type III 24-hr 1-Year Storm Rainfall=2.60"

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Summary for Subcatchment B: South D-Zone & S&W Perimeter

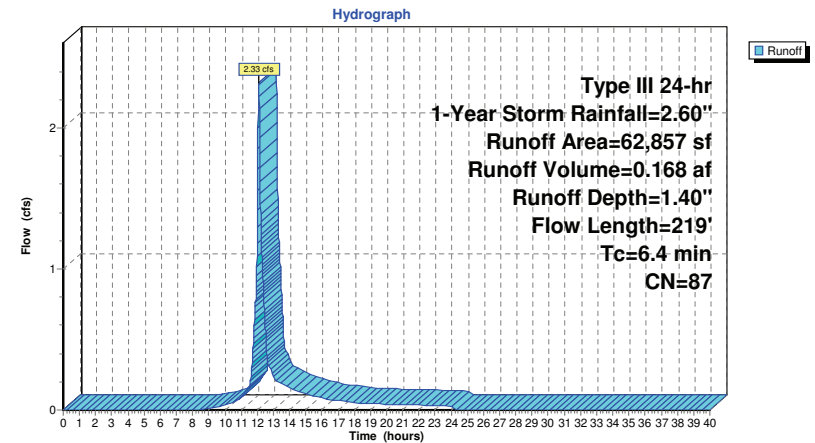
Runoff = 2.33 cfs @ 12.09 hrs, Volume= 0.168 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Storm Rainfall=2.60"

Area (sf)	CN	Description
* 21,236	98	Running Track
* 403	98	Roof
* 3,684	98	Asphalt Pavement
37,534	79	50-75% Grass cover, Fair, HSG C
62,857	87	Weighted Average
37,534		59.71% Pervious Area
25,323		40.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	60	0.0290	0.18		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.2	32	0.0390	3.18		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.6	127	0.0420	3.30		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
6.4	219	Total			

Subcatchment B: South D-Zone & S&W Perimeter



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Type III 24-hr 1-Year Storm Rainfall=2.60"

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Summary for Subcatchment C: East Perimeter

Runoff = 0.60 cfs @ 12.12 hrs, Volume= 0.047 af, Depth= 1.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Storm Rainfall=2.60"

Area (sf)	CN	Description
4,828	98	Asphalt Pavement
16,717	79	50-75% Grass cover, Fair, HSG C
21,545	83	Weighted Average
16,717		77.59% Pervious Area
4,828		22.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	60	0.0230	0.16		Sheet Flow , Grass: Short n= 0.150 P2= 3.20"
1.5	340	0.0050	3.72	4.57	Pipe Channel, Existing 15" RCP 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Concrete pipe, bends & connections
0.2	56	0.0050	5.09	16.00	Pipe Channel, Existing 24" RCP 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
0.5	143	0.0050	5.09	16.00	Pipe Channel, Existing 24" RCP 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
8.4	599	Total			

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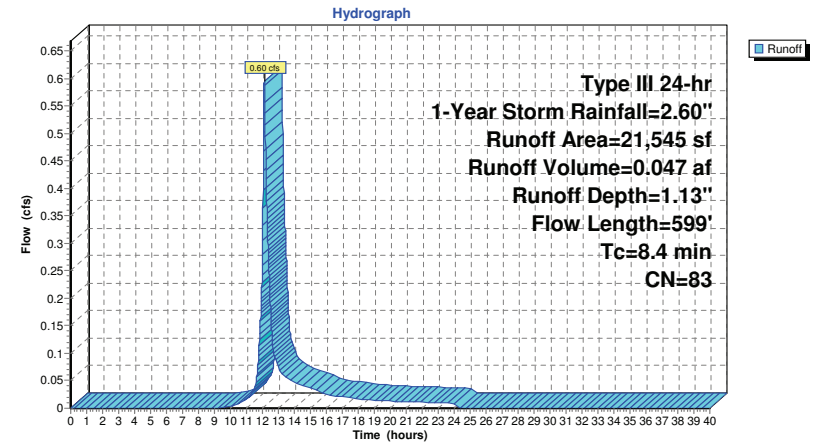
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Type III 24-hr 1-Year Storm Rainfall=2.60"

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Subcatchment C: East Perimeter

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Type III 24-hr 1-Year Storm Rainfall=2.60"

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Summary for Subcatchment D: North Perimeter

Runoff = 0.94 cfs @ 12.14 hrs, Volume= 0.077 af, Depth= 0.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Storm Rainfall=2.60"

Area (sf)	CN	Description
2,573	98	Asphalt Pavement
39,659	79	50-75% Grass cover, Fair, HSG C
42,232	80	Weighted Average
39,659		93.91% Pervious Area
2,573		6.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	60	0.0300	0.18		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.1	21	0.0500	3.60		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	98	0.0050	3.21	2.52	Pipe Channel, Existing 12" HDPE to Collector Pipe 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
1.7	336	0.0050	3.21	2.52	Pipe Channel, Existing 12" Collector Pipe 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
1.5	336	0.0050	3.72	4.57	Pipe Channel, Existing 15" RCP 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Concrete pipe, bends & connections
9.3	851	Total			

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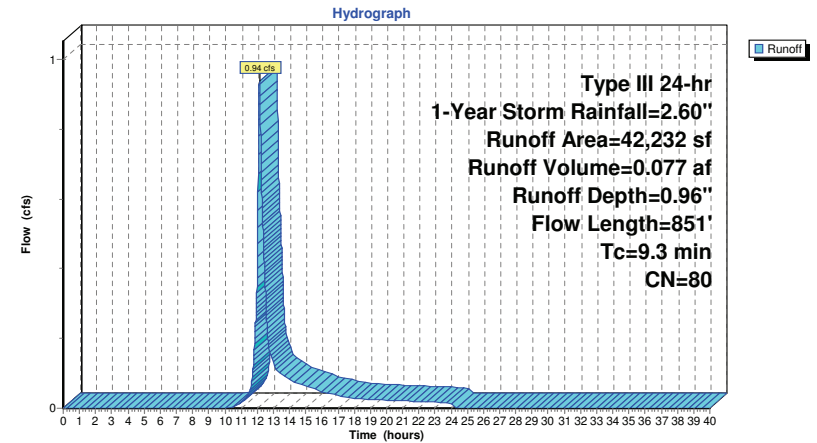
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Type III 24-hr 1-Year Storm Rainfall=2.60"

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Subcatchment D: North Perimeter



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Type III 24-hr 1-Year Storm Rainfall=2.60"

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Summary for Pond 1P: YD

Inflow Area = 4.282 ac, 18.36% Impervious, Inflow Depth = 1.09" for 1-Year Storm event
 Inflow = 5.08 cfs @ 12.11 hrs, Volume= 0.390 af
 Outflow = 5.08 cfs @ 12.11 hrs, Volume= 0.390 af, Atten= 0%, Lag= 0.0 min
 Primary = 5.08 cfs @ 12.11 hrs, Volume= 0.390 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 96.92' @ 12.11 hrs

Flood Elev= 103.97'

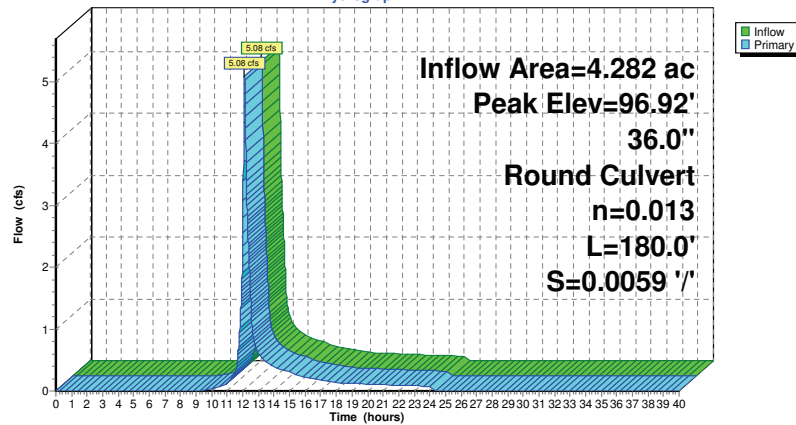
Device	Routing	Invert	Outlet Devices
#1	Primary	96.02'	36.0" Round 36" RCP L= 180.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 96.02' / 94.96' S= 0.0059 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 7.07 sf

Primary OutFlow Max=5.07 cfs @ 12.11 hrs HW=96.92' (Free Discharge)

1=36" RCP (Barrel Controls 5.07 cfs @ 4.28 fps)

Pond 1P: YD

Hydrograph

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Type III 24-hr 1-Year Storm Rainfall=2.60"

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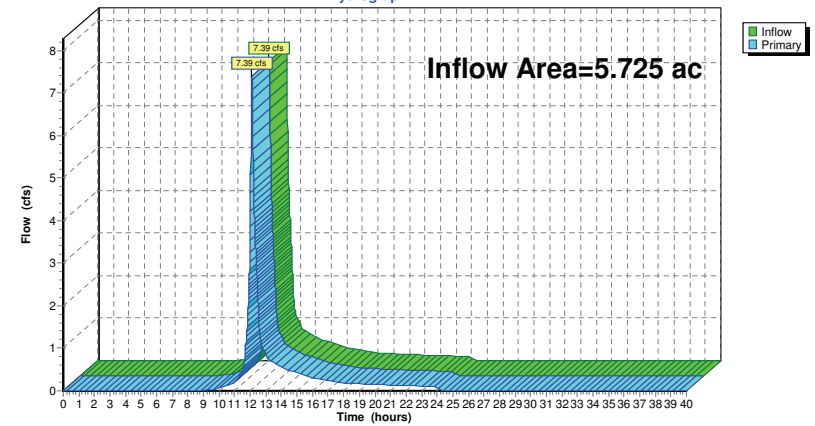
Summary for Link DP-1: South Wetland

Inflow Area = 5.725 ac, 23.89% Impervious, Inflow Depth = 1.17" for 1-Year Storm event
 Inflow = 7.39 cfs @ 12.10 hrs, Volume= 0.558 af
 Primary = 7.39 cfs @ 12.10 hrs, Volume= 0.558 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link DP-1: South Wetland

Hydrograph



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Type III 24-hr 2-Year Storm Rainfall=3.20"

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Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Track & North D-Zone Runoff Area=122,732 sf 21.87% Impervious Runoff Depth=1.61"
Flow Length=359' Tc=6.7 min CN=83 Runoff=5.18 cfs 0.378 af

Subcatchment B: South D-Zone & S&W Runoff Area=62,857 sf 40.29% Impervious Runoff Depth=1.91"
Flow Length=219' Tc=6.4 min CN=87 Runoff=3.19 cfs 0.230 af

Subcatchment C: East Perimeter Runoff Area=21,545 sf 22.41% Impervious Runoff Depth=1.61"
Flow Length=599' Tc=8.4 min CN=83 Runoff=0.86 cfs 0.066 af

Subcatchment D: North Perimeter Runoff Area=42,232 sf 6.09% Impervious Runoff Depth=1.40"
Flow Length=851' Tc=9.3 min CN=80 Runoff=1.41 cfs 0.113 af

Pond 1P: YD Peak Elev=97.11' Inflow=7.35 cfs 0.557 af
36.0" Round Culvert n=0.013 L=180.0' S=0.0059 '/' Outflow=7.35 cfs 0.557 af

Link DP-1: South Wetland Inflow=10.52 cfs 0.788 af
Primary=10.52 cfs 0.788 af

Total Runoff Area = 5.725 ac Runoff Volume = 0.788 af Average Runoff Depth = 1.65"
76.11% Pervious = 4.357 ac 23.89% Impervious = 1.367 ac

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Type III 24-hr 2-Year Storm Rainfall=3.20"

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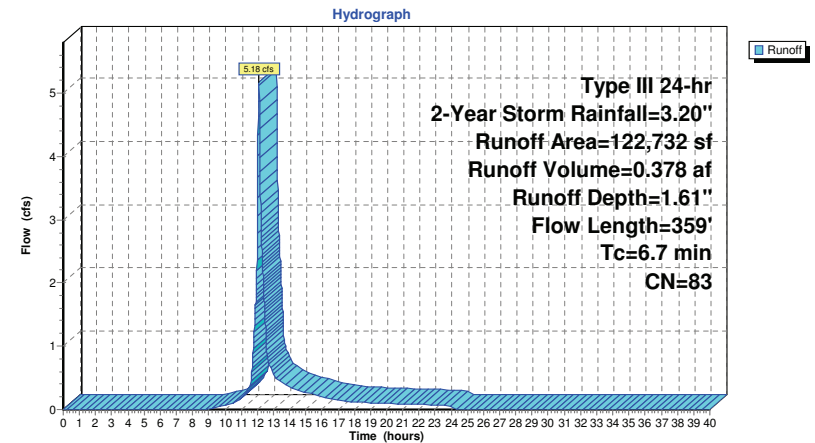
Summary for Subcatchment A: Track & North D-Zone

Runoff = 5.18 cfs @ 12.10 hrs, Volume= 0.378 af, Depth= 1.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
26,841	98	Running Track
95,891	79	50-75% Grass cover, Fair, HSG C
122,732	83	Weighted Average
95,891		78.13% Pervious Area
26,841		21.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	60	0.0420	0.21		Sheet Flow , Grass: Short n= 0.150 P2= 3.20"
1.4	156	0.0140	1.90		Shallow Concentrated Flow , Unpaved Kv= 16.1 fps
0.5	143	0.0050	5.09	16.00	Pipe Channel, Existing 24" RCP 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
6.7	359	Total			

Subcatchment A: Track & North D-Zone

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Type III 24-hr 2-Year Storm Rainfall=3.20"

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Summary for Subcatchment B: South D-Zone & S&W Perimeter

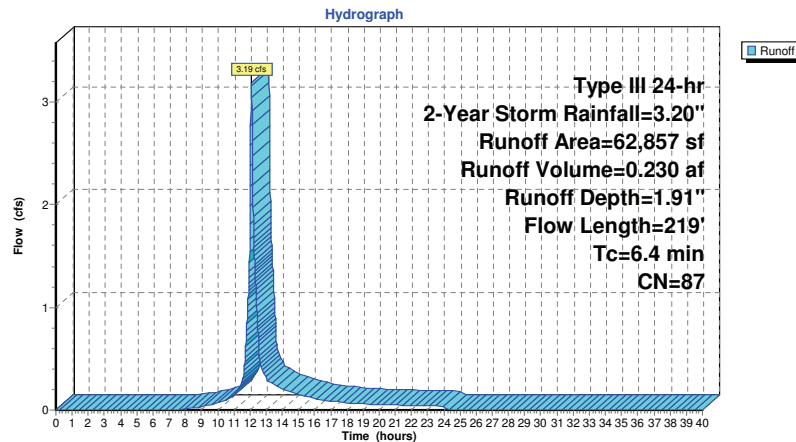
Runoff = 3.19 cfs @ 12.09 hrs, Volume= 0.230 af, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
* 21,236	98	Running Track
* 403	98	Roof
* 3,684	98	Asphalt Pavement
37,534	79	50-75% Grass cover, Fair, HSG C
62,857	87	Weighted Average
37,534		59.71% Pervious Area
25,323		40.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	60	0.0290	0.18		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.2	32	0.0390	3.18		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.6	127	0.0420	3.30		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
6.4	219	Total			

Subcatchment B: South D-Zone & S&W Perimeter



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Type III 24-hr 2-Year Storm Rainfall=3.20"

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Summary for Subcatchment C: East Perimeter

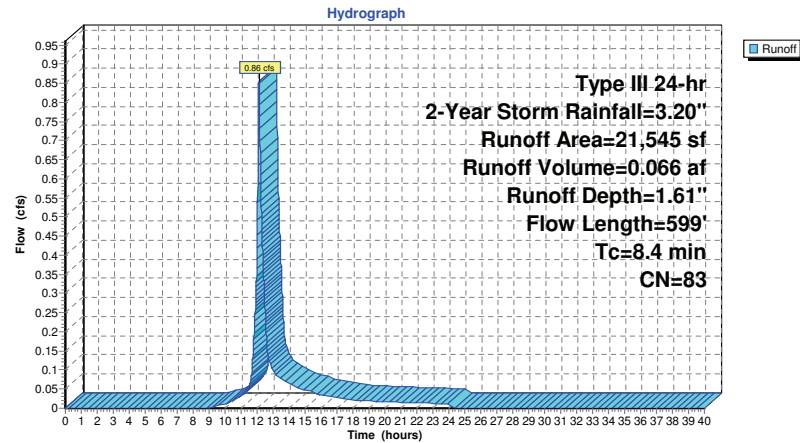
Runoff = 0.86 cfs @ 12.12 hrs, Volume= 0.066 af, Depth= 1.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
* 4,828	98	Asphalt Pavement
16,717	79	50-75% Grass cover, Fair, HSG C
21,545	83	Weighted Average
16,717		77.59% Pervious Area
4,828		22.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	60	0.0230	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.5	340	0.0050	3.72	4.57	Pipe Channel, Existing 15" RCP 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Concrete pipe, bends & connections
0.2	56	0.0050	5.09	16.00	Pipe Channel, Existing 24" RCP 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
0.5	143	0.0050	5.09	16.00	Pipe Channel, Existing 24" RCP 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
8.4	599	Total			

Subcatchment C: East Perimeter



Summary for Subcatchment D: North Perimeter

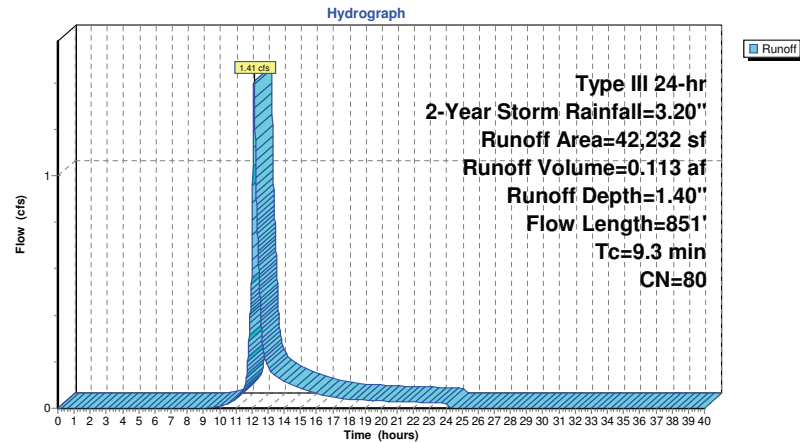
Runoff = 1.41 cfs @ 12.14 hrs, Volume= 0.113 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
2,573	98	Asphalt Pavement
39,659	79	50-75% Grass cover, Fair, HSG C
42,232	80	Weighted Average
39,659		93.91% Pervious Area
2,573		6.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	60	0.0300	0.18		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.1	21	0.0500	3.60		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	98	0.0050	3.21	2.52	Pipe Channel, Existing 12" HDPE to Collector Pipe 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
1.7	336	0.0050	3.21	2.52	Pipe Channel, Existing 12" Collector Pipe 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
1.5	336	0.0050	3.72	4.57	Pipe Channel, Existing 15" RCP 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Concrete pipe, bends & connections
9.3	851	Total			

Subcatchment D: North Perimeter



Summary for Pond 1P: YD

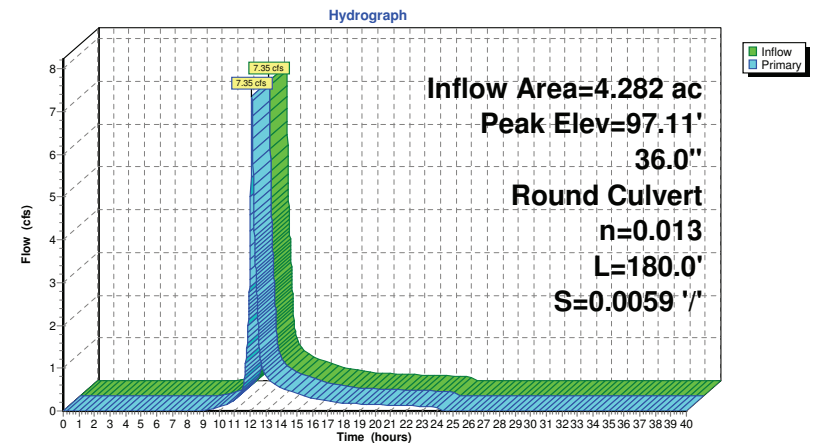
Inflow Area = 4.282 ac, 18.36% Impervious, Inflow Depth = 1.56" for 2-Year Storm event
 Inflow = 7.35 cfs @ 12.11 hrs, Volume= 0.557 af
 Outflow = 7.35 cfs @ 12.11 hrs, Volume= 0.557 af, Atten= 0%, Lag= 0.0 min
 Primary = 7.35 cfs @ 12.11 hrs, Volume= 0.557 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 97.11' @ 12.11 hrs
 Flood Elev= 103.97'

Device	Routing	Invert	Outlet Devices
#1	Primary	96.02'	36.0" Round 36" RCP L= 180.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 96.02' / 94.96' S= 0.0059 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 7.07 sf

Primary OutFlow Max=7.34 cfs @ 12.11 hrs HW=97.11' (Free Discharge)
 1=36" RCP (Barrel Controls 7.34 cfs @ 4.69 fps)

Pond 1P: YD



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Type III 24-hr 2-Year Storm Rainfall=3.20"

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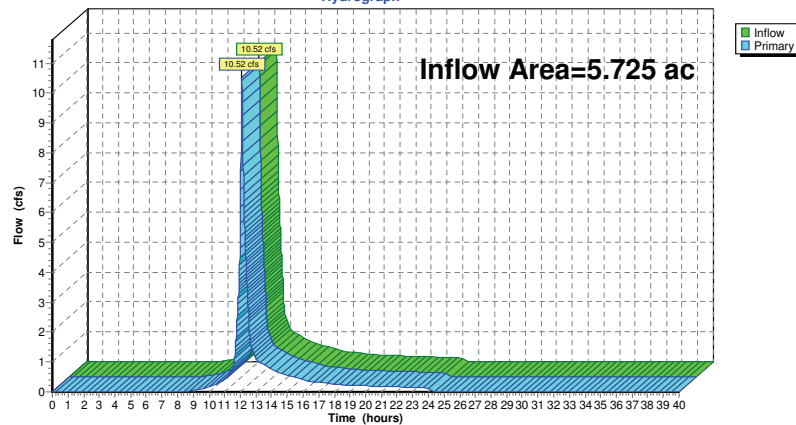
Summary for Link DP-1: South Wetland

Inflow Area = 5.725 ac, 23.89% Impervious, Inflow Depth = 1.65" for 2-Year Storm event
 Inflow = 10.52 cfs @ 12.10 hrs, Volume= 0.788 af
 Primary = 10.52 cfs @ 12.10 hrs, Volume= 0.788 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link DP-1: South Wetland

Hydrograph

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Type III 24-hr 10-Year Storm Rainfall=4.70"

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Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Track & North D-Zone Runoff Area=122,732 sf 21.87% Impervious Runoff Depth=2.90"
 Flow Length=359' Tc=6.7 min CN=83 Runoff=9.34 cfs 0.682 af

Subcatchment B: South D-Zone & S&W Runoff Area=62,857 sf 40.29% Impervious Runoff Depth=3.29"
 Flow Length=219' Tc=6.4 min CN=87 Runoff=5.40 cfs 0.395 af

Subcatchment C: East Perimeter Runoff Area=21,545 sf 22.41% Impervious Runoff Depth=2.90"
 Flow Length=599' Tc=8.4 min CN=83 Runoff=1.55 cfs 0.120 af

Subcatchment D: North Perimeter Runoff Area=42,232 sf 6.09% Impervious Runoff Depth=2.63"
 Flow Length=851' Tc=9.3 min CN=80 Runoff=2.67 cfs 0.213 af

Pond 1P: YD Peak Elev=97.55' Inflow=13.40 cfs 1.014 af
 36.0" Round Culvert n=0.013 L=180.0' S=0.0059 '/' Outflow=13.40 cfs 1.014 af

Link DP-1: South Wetland Inflow=18.76 cfs 1.409 af
 Primary=18.76 cfs 1.409 af

Total Runoff Area = 5.725 ac Runoff Volume = 1.409 af Average Runoff Depth = 2.95"
76.11% Pervious = 4.357 ac 23.89% Impervious = 1.367 ac

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Type III 24-hr 10-Year Storm Rainfall=4.70"

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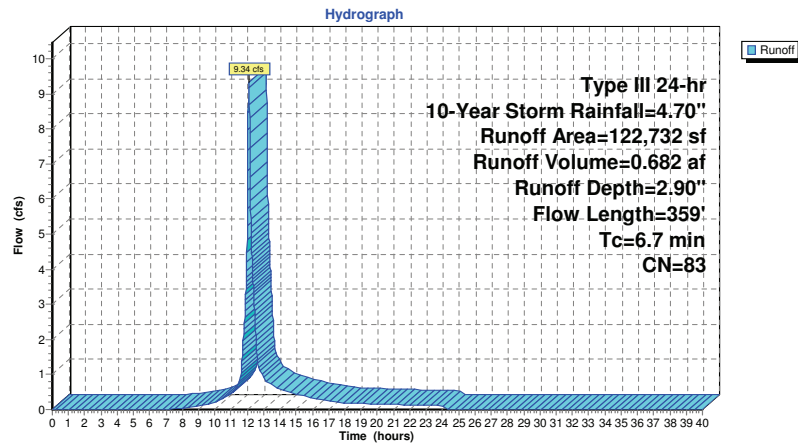
Summary for Subcatchment A: Track & North D-Zone

Runoff = 9.34 cfs @ 12.10 hrs, Volume= 0.682 af, Depth= 2.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
* 26,841	98	Running Track
95,891	79	50-75% Grass cover, Fair, HSG C
122,732	83	Weighted Average
95,891		78.13% Pervious Area
26,841		21.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	60	0.0420	0.21		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.4	156	0.0140	1.90		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	143	0.0050	5.09	16.00	Pipe Channel, Existing 24" RCP 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
6.7	359	Total			

Subcatchment A: Track & North D-Zone**19014_PRE**

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Type III 24-hr 10-Year Storm Rainfall=4.70"

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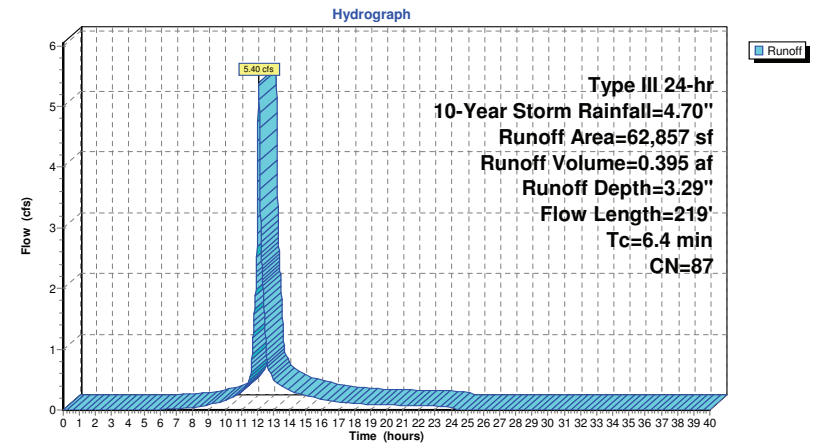
Summary for Subcatchment B: South D-Zone & S&W Perimeter

Runoff = 5.40 cfs @ 12.09 hrs, Volume= 0.395 af, Depth= 3.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
* 21,236	98	Running Track
* 403	98	Roof
* 3,684	98	Asphalt Pavement
37,534	79	50-75% Grass cover, Fair, HSG C
62,857	87	Weighted Average
37,534		59.71% Pervious Area
25,323		40.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	60	0.0290	0.18		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.2	32	0.0390	3.18		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.6	127	0.0420	3.30		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
6.4	219	Total			

Subcatchment B: South D-Zone & S&W Perimeter

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Type III 24-hr 10-Year Storm Rainfall=4.70"

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Summary for Subcatchment C: East Perimeter

Runoff = 1.55 cfs @ 12.12 hrs, Volume= 0.120 af, Depth= 2.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
* 4,828	98	Asphalt Pavement
16,717	79	50-75% Grass cover, Fair, HSG C
21,545	83	Weighted Average
16,717		77.59% Pervious Area
4,828		22.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	60	0.0230	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.5	340	0.0050	3.72	4.57	Pipe Channel, Existing 15" RCP 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Concrete pipe, bends & connections
0.2	56	0.0050	5.09	16.00	Pipe Channel, Existing 24" RCP 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
0.5	143	0.0050	5.09	16.00	Pipe Channel, Existing 24" RCP 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
8.4	599	Total			

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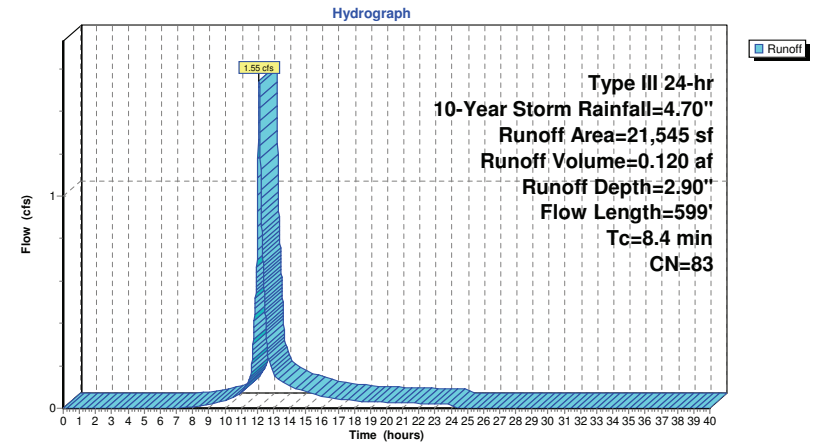
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Type III 24-hr 10-Year Storm Rainfall=4.70"

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Subcatchment C: East Perimeter

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Type III 24-hr 10-Year Storm Rainfall=4.70"

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Summary for Subcatchment D: North Perimeter

Runoff = 2.67 cfs @ 12.13 hrs, Volume= 0.213 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
2,573	98	Asphalt Pavement
39,659	79	50-75% Grass cover, Fair, HSG C
42,232	80	Weighted Average
39,659		93.91% Pervious Area
2,573		6.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	60	0.0300	0.18		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.1	21	0.0500	3.60		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	98	0.0050	3.21	2.52	Pipe Channel, Existing 12" HDPE to Collector Pipe 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
1.7	336	0.0050	3.21	2.52	Pipe Channel, Existing 12" Collector Pipe 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
1.5	336	0.0050	3.72	4.57	Pipe Channel, Existing 15" RCP 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Concrete pipe, bends & connections
9.3	851	Total			

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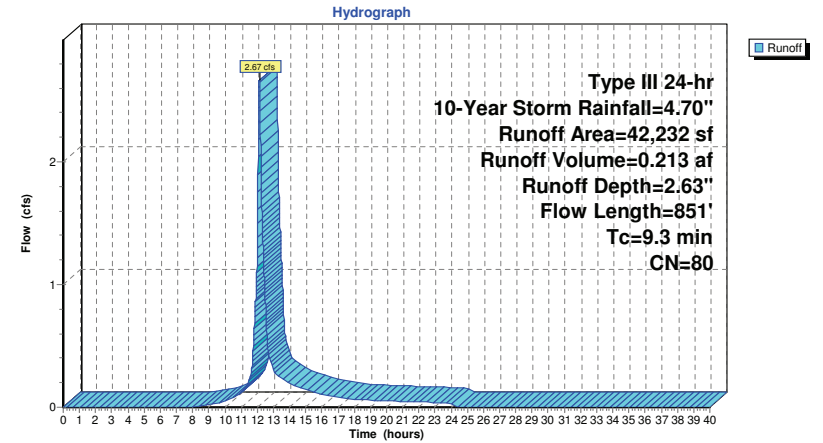
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Type III 24-hr 10-Year Storm Rainfall=4.70"

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Subcatchment D: North Perimeter



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Type III 24-hr 10-Year Storm Rainfall=4.70"

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Summary for Pond 1P: YD

Inflow Area = 4.282 ac, 18.36% Impervious, Inflow Depth = 2.84" for 10-Year Storm event
 Inflow = 13.40 cfs @ 12.10 hrs, Volume= 1.014 af
 Outflow = 13.40 cfs @ 12.10 hrs, Volume= 1.014 af, Atten= 0%, Lag= 0.0 min
 Primary = 13.40 cfs @ 12.10 hrs, Volume= 1.014 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 97.55' @ 12.10 hrs

Flood Elev= 103.97'

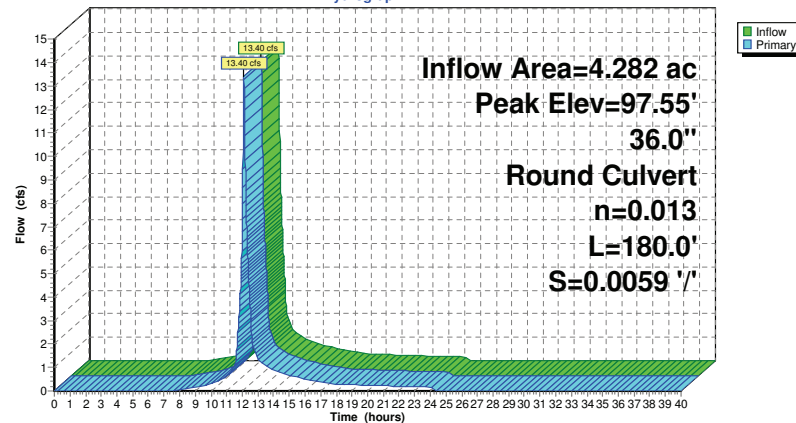
Device	Routing	Invert	Outlet Devices
#1	Primary	96.02'	36.0" Round 36" RCP L= 180.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 96.02' / 94.96' S= 0.0059 '/ S= 0.0059 '/ Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 7.07 sf

Primary OutFlow Max=13.38 cfs @ 12.10 hrs HW=97.55' (Free Discharge)

1=36" RCP (Barrel Controls 13.38 cfs @ 5.40 fps)

Pond 1P: YD

Hydrograph

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Type III 24-hr 10-Year Storm Rainfall=4.70"

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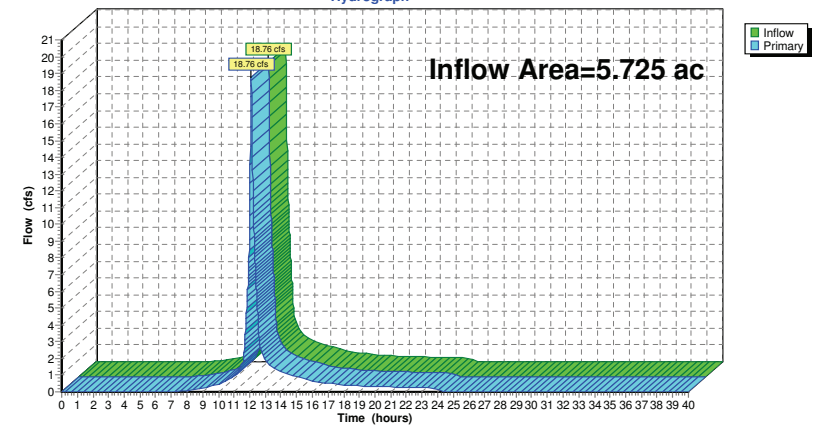
Summary for Link DP-1: South Wetland

Inflow Area = 5.725 ac, 23.89% Impervious, Inflow Depth = 2.95" for 10-Year Storm event
 Inflow = 18.76 cfs @ 12.10 hrs, Volume= 1.409 af
 Primary = 18.76 cfs @ 12.10 hrs, Volume= 1.409 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link DP-1: South Wetland

Hydrograph



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Type III 24-hr 25-Year Storm Rainfall=5.50"

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Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Track & North D-Zone Runoff Area=122,732 sf 21.87% Impervious Runoff Depth=3.63"
Flow Length=359' Tc=6.7 min CN=83 Runoff=11.61 cfs 0.852 af

Subcatchment B: South D-Zone & S&W Runoff Area=62,857 sf 40.29% Impervious Runoff Depth=4.04"
Flow Length=219' Tc=6.4 min CN=87 Runoff=6.58 cfs 0.486 af

Subcatchment C: East Perimeter Runoff Area=21,545 sf 22.41% Impervious Runoff Depth=3.63"
Flow Length=599' Tc=8.4 min CN=83 Runoff=1.92 cfs 0.150 af

Subcatchment D: North Perimeter Runoff Area=42,232 sf 6.09% Impervious Runoff Depth=3.33"
Flow Length=851' Tc=9.3 min CN=80 Runoff=3.38 cfs 0.269 af

Pond 1P: YD Peak Elev=97.76' Inflow=16.73 cfs 1.271 af
36.0" Round Culvert n=0.013 L=180.0' S=0.0059 1' Outflow=16.73 cfs 1.271 af

Link DP-1: South Wetland Inflow=23.26 cfs 1.757 af
Primary=23.26 cfs 1.757 af

Total Runoff Area = 5.725 ac Runoff Volume = 1.757 af Average Runoff Depth = 3.68"
76.11% Pervious = 4.357 ac 23.89% Impervious = 1.367 ac

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Type III 24-hr 25-Year Storm Rainfall=5.50"

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Summary for Subcatchment A: Track & North D-Zone

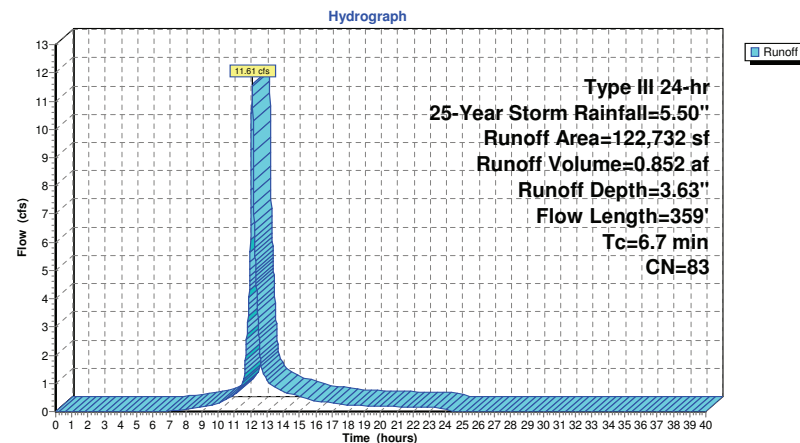
Runoff = 11.61 cfs @ 12.10 hrs, Volume= 0.852 af, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
26,841	98	Running Track
95,891	79	50-75% Grass cover, Fair, HSG C
122,732	83	Weighted Average
95,891		78.13% Pervious Area
26,841		21.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	60	0.0420	0.21		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.4	156	0.0140	1.90		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	143	0.0050	5.09	16.00	Pipe Channel, Existing 24" RCP 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
6.7	359	Total			

Subcatchment A: Track & North D-Zone



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Type III 24-hr 25-Year Storm Rainfall=5.50"

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Summary for Subcatchment B: South D-Zone & S&W Perimeter

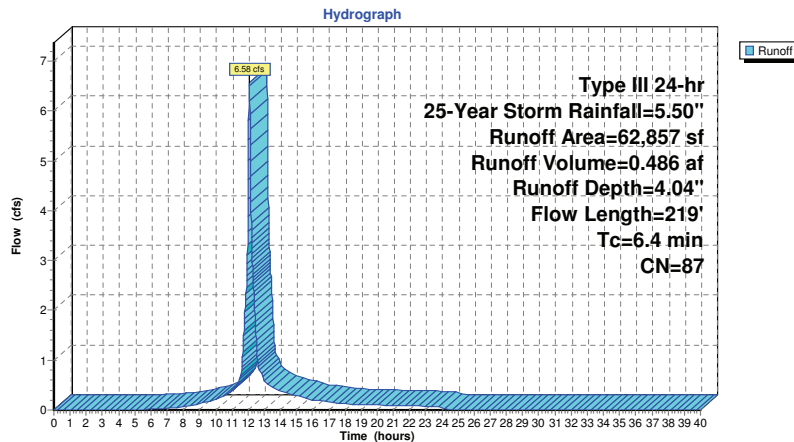
Runoff = 6.58 cfs @ 12.09 hrs, Volume= 0.486 af, Depth= 4.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
* 21,236	98	Running Track
* 403	98	Roof
* 3,684	98	Asphalt Pavement
37,534	79	50-75% Grass cover, Fair, HSG C
62,857	87	Weighted Average
37,534		59.71% Pervious Area
25,323		40.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	60	0.0290	0.18		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.2	32	0.0390	3.18		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.6	127	0.0420	3.30		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
6.4	219	Total			

Subcatchment B: South D-Zone & S&W Perimeter



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Type III 24-hr 25-Year Storm Rainfall=5.50"

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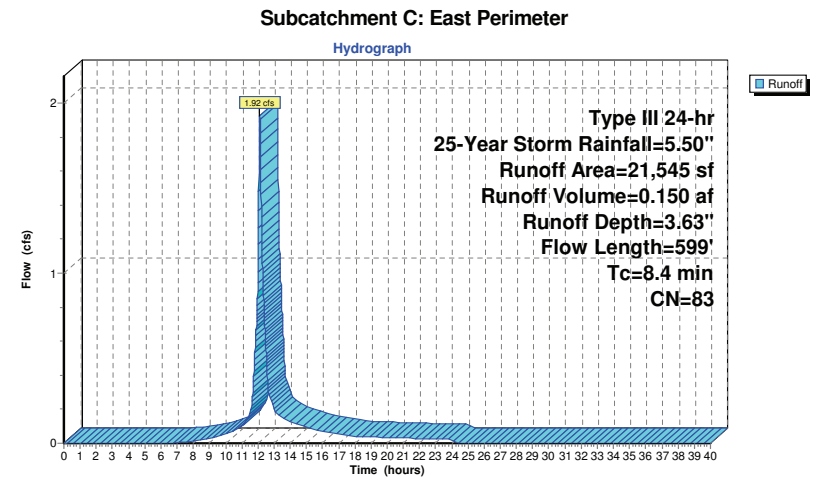
Summary for Subcatchment C: East Perimeter

Runoff = 1.92 cfs @ 12.12 hrs, Volume= 0.150 af, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
* 4,828	98	Asphalt Pavement
16,717	79	50-75% Grass cover, Fair, HSG C
21,545	83	Weighted Average
16,717		77.59% Pervious Area
4,828		22.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	60	0.0230	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.5	340	0.0050	3.72	4.57	Pipe Channel, Existing 15" RCP 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Concrete pipe, bends & connections
0.2	56	0.0050	5.09	16.00	Pipe Channel, Existing 24" RCP 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
0.5	143	0.0050	5.09	16.00	Pipe Channel, Existing 24" RCP 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
8.4	599	Total			



Summary for Subcatchment D: North Perimeter

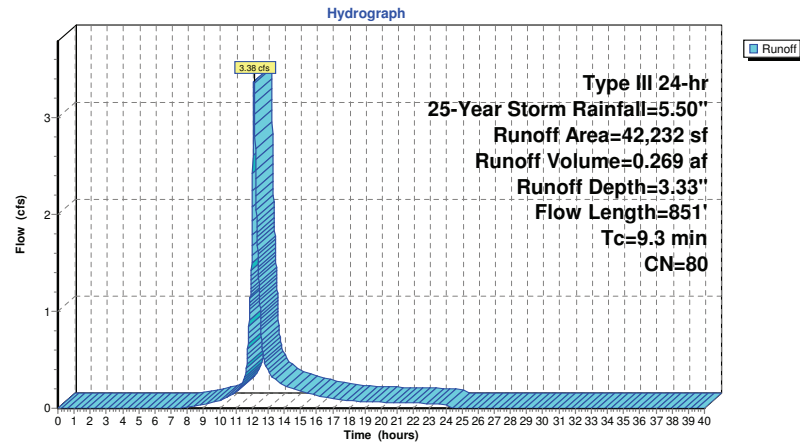
Runoff = 3.38 cfs @ 12.13 hrs, Volume= 0.269 af, Depth= 3.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
2,573	98	Asphalt Pavement
39,659	79	50-75% Grass cover, Fair, HSG C
42,232	80	Weighted Average
39,659		93.91% Pervious Area
2,573		6.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	60	0.0300	0.18		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.1	21	0.0500	3.60		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	98	0.0050	3.21	2.52	Pipe Channel, Existing 12" HDPE to Collector Pipe 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
1.7	336	0.0050	3.21	2.52	Pipe Channel, Existing 12" Collector Pipe 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
1.5	336	0.0050	3.72	4.57	Pipe Channel, Existing 15" RCP 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Concrete pipe, bends & connections
9.3	851	Total			

Subcatchment D: North Perimeter



Summary for Pond 1P: YD

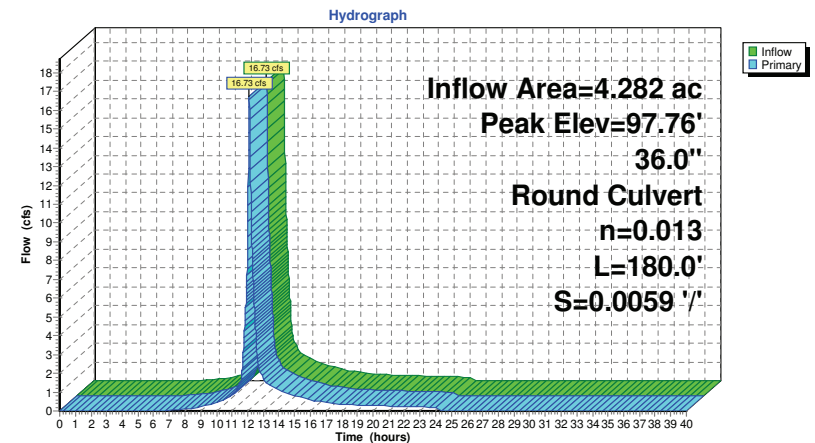
Inflow Area = 4.282 ac, 18.36% Impervious, Inflow Depth = 3.56" for 25-Year Storm event
 Inflow = 16.73 cfs @ 12.10 hrs, Volume= 1.271 af
 Outflow = 16.73 cfs @ 12.10 hrs, Volume= 1.271 af, Atten= 0%, Lag= 0.0 min
 Primary = 16.73 cfs @ 12.10 hrs, Volume= 1.271 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 97.76' @ 12.10 hrs
 Flood Elev= 103.97'

Device	Routing	Invert	Outlet Devices
#1	Primary	96.02'	36.0" Round 36" RCP L= 180.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 96.02' / 94.96' S= 0.0059 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 7.07 sf

Primary OutFlow Max=16.70 cfs @ 12.10 hrs HW=97.76' (Free Discharge)
 1=36" RCP (Barrel Controls 16.70 cfs @ 5.68 fps)

Pond 1P: YD



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Type III 24-hr 25-Year Storm Rainfall=5.50"

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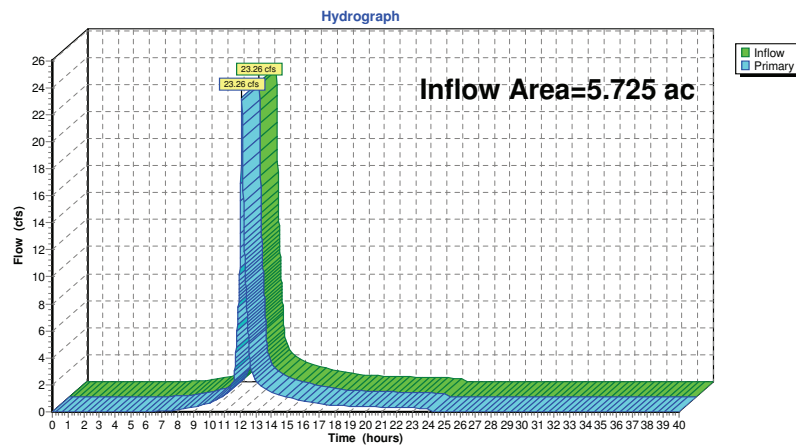
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Summary for Link DP-1: South Wetland

Inflow Area = 5.725 ac, 23.89% Impervious, Inflow Depth = 3.68" for 25-Year Storm event
Inflow = 23.26 cfs @ 12.10 hrs, Volume= 1.757 af
Primary = 23.26 cfs @ 12.10 hrs, Volume= 1.757 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link DP-1: South Wetland**19014_PRE**

Type III 24-hr 100-Year Storm Rainfall=6.90"

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Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Track & North D-Zone Runoff Area=122,732 sf 21.87% Impervious Runoff Depth=4.93"
Flow Length=359' Tc=6.7 min CN=83 Runoff=15.61 cfs 1.158 af

Subcatchment B: South D-Zone & S&W Runoff Area=62,857 sf 40.29% Impervious Runoff Depth=5.38"
Flow Length=219' Tc=6.4 min CN=87 Runoff=8.65 cfs 0.647 af

Subcatchment C: East Perimeter Runoff Area=21,545 sf 22.41% Impervious Runoff Depth=4.93"
Flow Length=599' Tc=8.4 min CN=83 Runoff=2.59 cfs 0.203 af

Subcatchment D: North Perimeter Runoff Area=42,232 sf 6.09% Impervious Runoff Depth=4.60"
Flow Length=851' Tc=9.3 min CN=80 Runoff=4.64 cfs 0.372 af

Pond 1P: YD Peak Elev=98.10' Inflow=22.59 cfs 1.734 af
36.0" Round Culvert n=0.013 L=180.0' S=0.0059 '/' Outflow=22.59 cfs 1.734 af

Link DP-1: South Wetland Inflow=31.17 cfs 2.381 af
Primary=31.17 cfs 2.381 af

Total Runoff Area = 5.725 ac Runoff Volume = 2.381 af Average Runoff Depth = 4.99"
76.11% Pervious = 4.357 ac 23.89% Impervious = 1.367 ac

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Type III 24-hr 100-Year Storm Rainfall=6.90"

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Summary for Subcatchment A: Track & North D-Zone

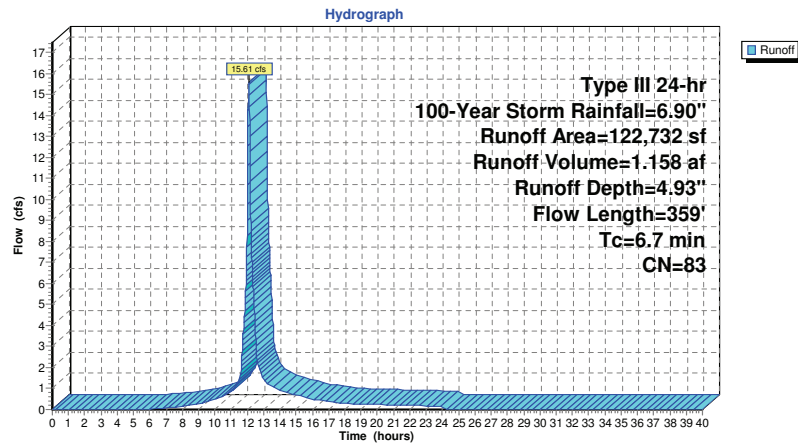
Runoff = 15.61 cfs @ 12.10 hrs, Volume= 1.158 af, Depth= 4.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.90"

Area (sf)	CN	Description
* 26,841	98	Running Track
95,891	79	50-75% Grass cover, Fair, HSG C
122,732	83	Weighted Average
95,891		78.13% Pervious Area
26,841		21.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	60	0.0420	0.21		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.4	156	0.0140	1.90		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	143	0.0050	5.09	16.00	Pipe Channel, Existing 24" RCP 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
6.7	359	Total			

Subcatchment A: Track & North D-Zone



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Type III 24-hr 100-Year Storm Rainfall=6.90"

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Summary for Subcatchment B: South D-Zone & S&W Perimeter

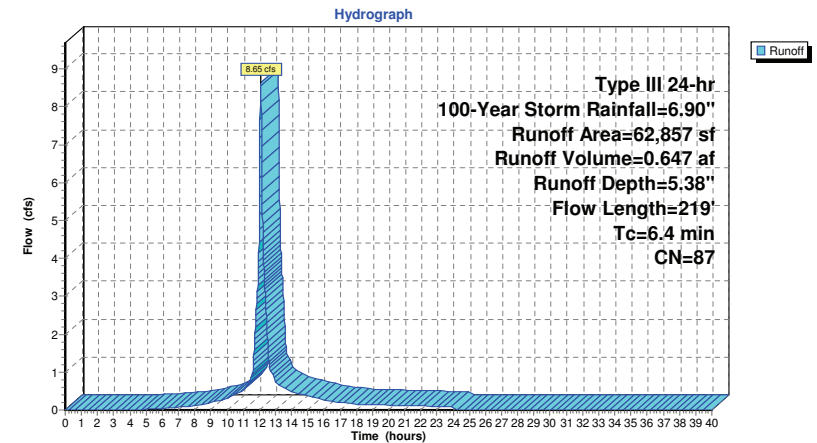
Runoff = 8.65 cfs @ 12.09 hrs, Volume= 0.647 af, Depth= 5.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.90"

Area (sf)	CN	Description
* 21,236	98	Running Track
* 403	98	Roof
* 3,684	98	Asphalt Pavement
37,534	79	50-75% Grass cover, Fair, HSG C
62,857	87	Weighted Average
37,534		59.71% Pervious Area
25,323		40.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	60	0.0290	0.18		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.2	32	0.0390	3.18		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.6	127	0.0420	3.30		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
6.4	219	Total			

Subcatchment B: South D-Zone & S&W Perimeter



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Type III 24-hr 100-Year Storm Rainfall=6.90"

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Summary for Subcatchment C: East Perimeter

Runoff = 2.59 cfs @ 12.12 hrs, Volume= 0.203 af, Depth= 4.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.90"

Area (sf)	CN	Description
4,828	98	Asphalt Pavement
16,717	79	50-75% Grass cover, Fair, HSG C
21,545	83	Weighted Average
16,717		77.59% Pervious Area
4,828		22.41% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	60	0.0230	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.5	340	0.0050	3.72	4.57	Pipe Channel, Existing 15" RCP 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Concrete pipe, bends & connections
0.2	56	0.0050	5.09	16.00	Pipe Channel, Existing 24" RCP 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
0.5	143	0.0050	5.09	16.00	Pipe Channel, Existing 24" RCP 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
8.4	599	Total			

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Type III 24-hr 100-Year Storm Rainfall=6.90"

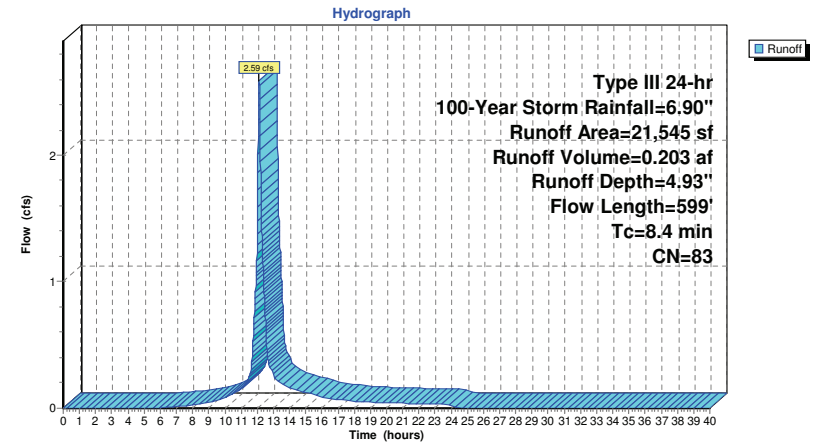
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Subcatchment C: East Perimeter



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Type III 24-hr 100-Year Storm Rainfall=6.90"

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Summary for Subcatchment D: North Perimeter

Runoff = 4.64 cfs @ 12.13 hrs, Volume= 0.372 af, Depth= 4.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.90"

Area (sf)	CN	Description
2,573	98	Asphalt Pavement
39,659	79	50-75% Grass cover, Fair, HSG C
42,232	80	Weighted Average
39,659		93.91% Pervious Area
2,573		6.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	60	0.0300	0.18		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.1	21	0.0500	3.60		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.5	98	0.0050	3.21	2.52	Pipe Channel, Existing 12" HDPE to Collector Pipe 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
1.7	336	0.0050	3.21	2.52	Pipe Channel, Existing 12" Collector Pipe 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
1.5	336	0.0050	3.72	4.57	Pipe Channel, Existing 15" RCP 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Concrete pipe, bends & connections
9.3	851	Total			

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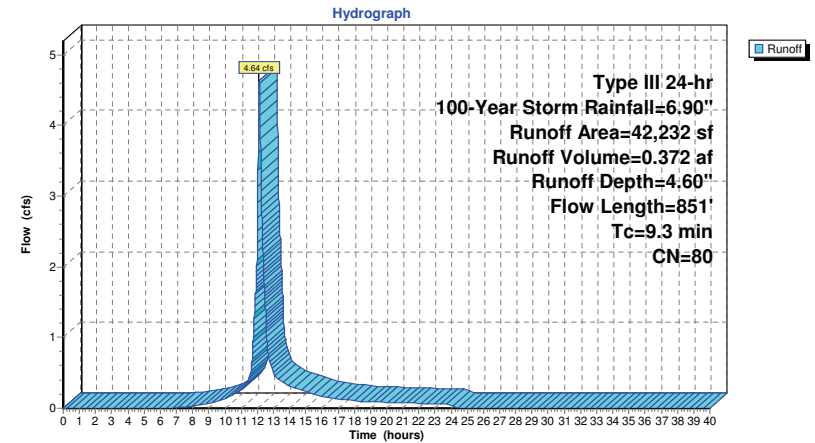
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Type III 24-hr 100-Year Storm Rainfall=6.90"

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Subcatchment D: North Perimeter

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Type III 24-hr 100-Year Storm Rainfall=6.90"

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Summary for Pond 1P: YD

Inflow Area = 4.282 ac, 18.36% Impervious, Inflow Depth = 4.86" for 100-Year Storm event
 Inflow = 22.59 cfs @ 12.10 hrs, Volume= 1.734 af
 Outflow = 22.59 cfs @ 12.10 hrs, Volume= 1.734 af, Atten= 0%, Lag= 0.0 min
 Primary = 22.59 cfs @ 12.10 hrs, Volume= 1.734 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 98.10' @ 12.10 hrs

Flood Elev= 103.97'

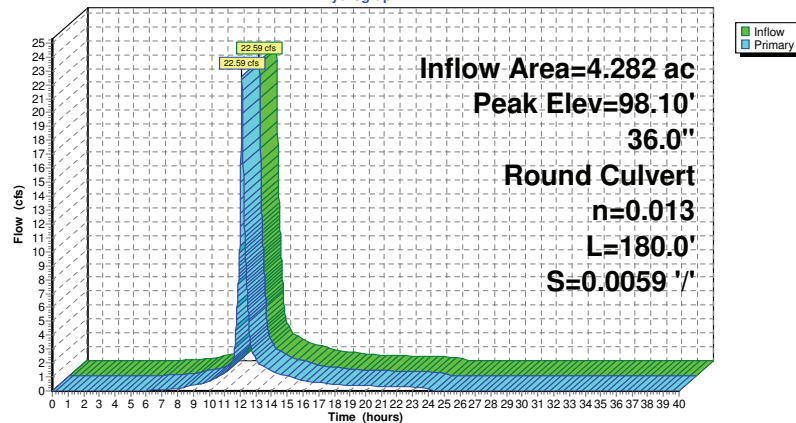
Device	Routing	Invert	Outlet Devices
#1	Primary	96.02'	36.0" Round 36" RCP L= 180.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 96.02' / 94.96' S= 0.0059 '/ S= 0.0059 '/ Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 7.07 sf

Primary OutFlow Max=22.56 cfs @ 12.10 hrs HW=98.10' (Free Discharge)

1=36" RCP (Barrel Controls 22.56 cfs @ 6.07 fps)

Pond 1P: YD

Hydrograph

**19014_PRE**

Type III 24-hr 100-Year Storm Rainfall=6.90"

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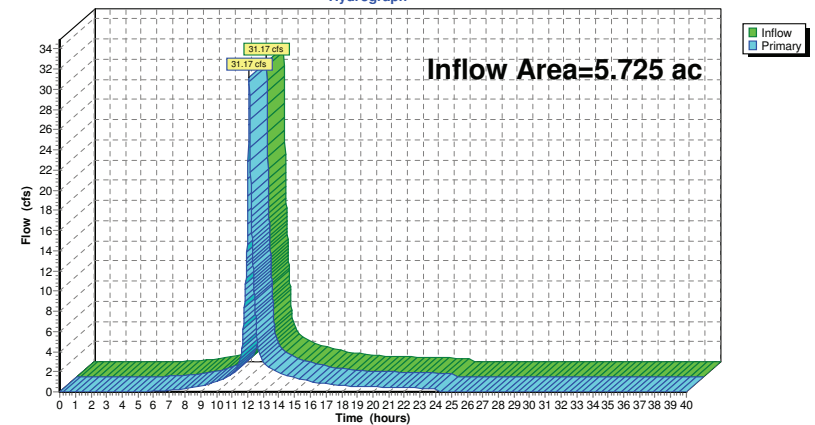
Summary for Link DP-1: South Wetland

Inflow Area = 5.725 ac, 23.89% Impervious, Inflow Depth = 4.99" for 100-Year Storm event
 Inflow = 31.17 cfs @ 12.10 hrs, Volume= 2.381 af
 Primary = 31.17 cfs @ 12.10 hrs, Volume= 2.381 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link DP-1: South Wetland

Hydrograph



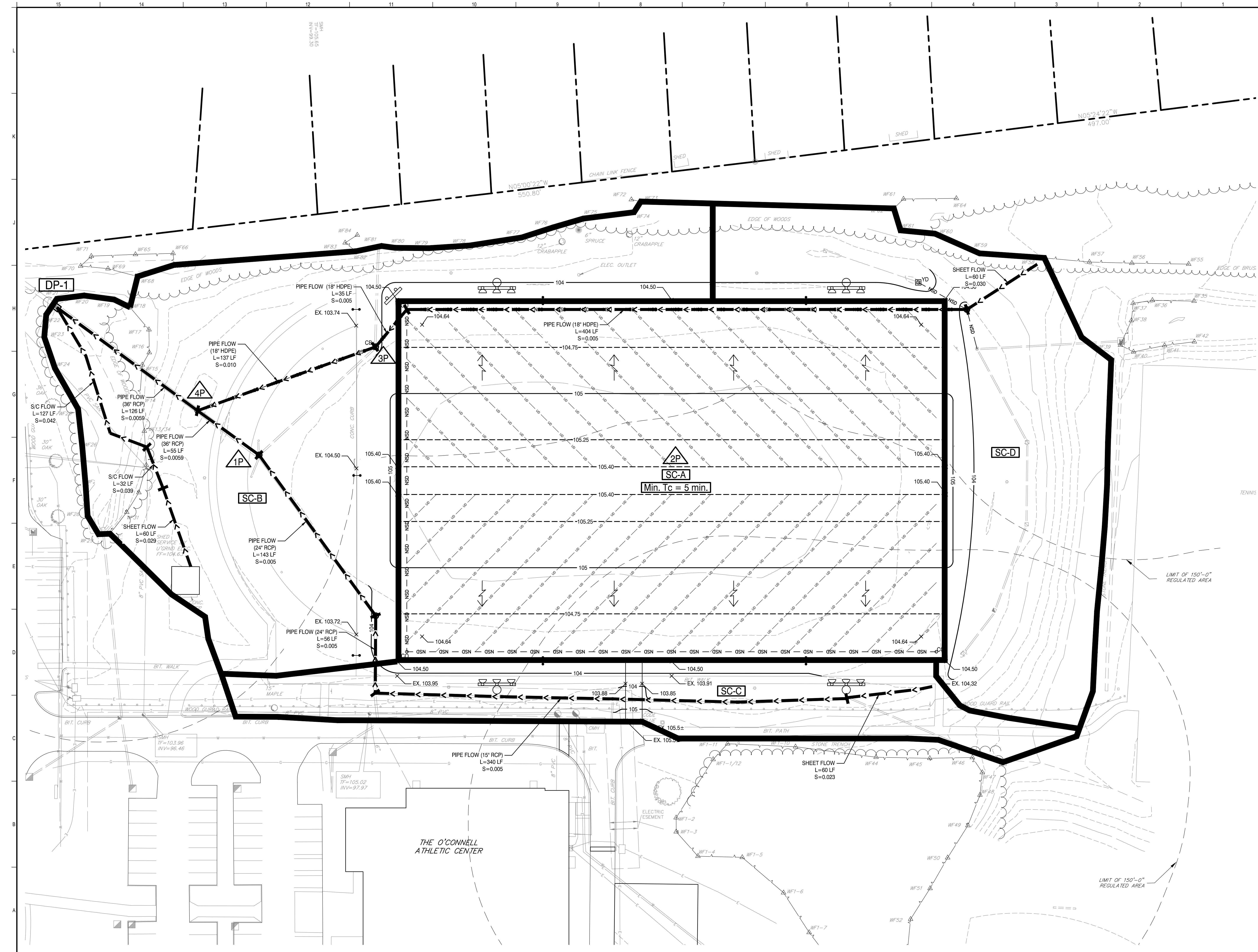
University of Saint Joseph – Athletic Field Renovations
Stormwater Management Report

Post-Development Conditions Analysis

Appendix D

CONTENTS:

1. Post-development Watershed Map
2. Post-development HydroCAD Runoff and Routing Calculations




0	ISSUED FOR PERMITTING	02-20-19
REV	DESCRIPTION	DATE

ISSUED FOR PERMITTING
02-20-19
CURRENT ISSUE STATUS:



TRUE NORTH:

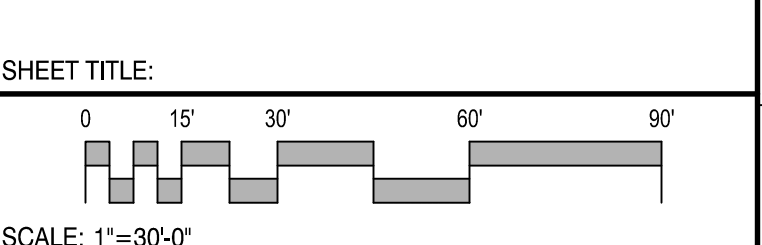


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ATHLETIC FIELD RENOVATIONS**

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**POST-DEVELOPMENT
WATERSHED MAP**



PROJECT MANAGER:	RFW	PROJECT NO:	19014
A/E OF RECORD:	MAF		
JOB CAPTAIN:	-		
DRAWN BY:	MAF		
SMRT FILE:	C-121-19014.dwg	SHEET No.	C-121

NOT FOR CONSTRUCTION

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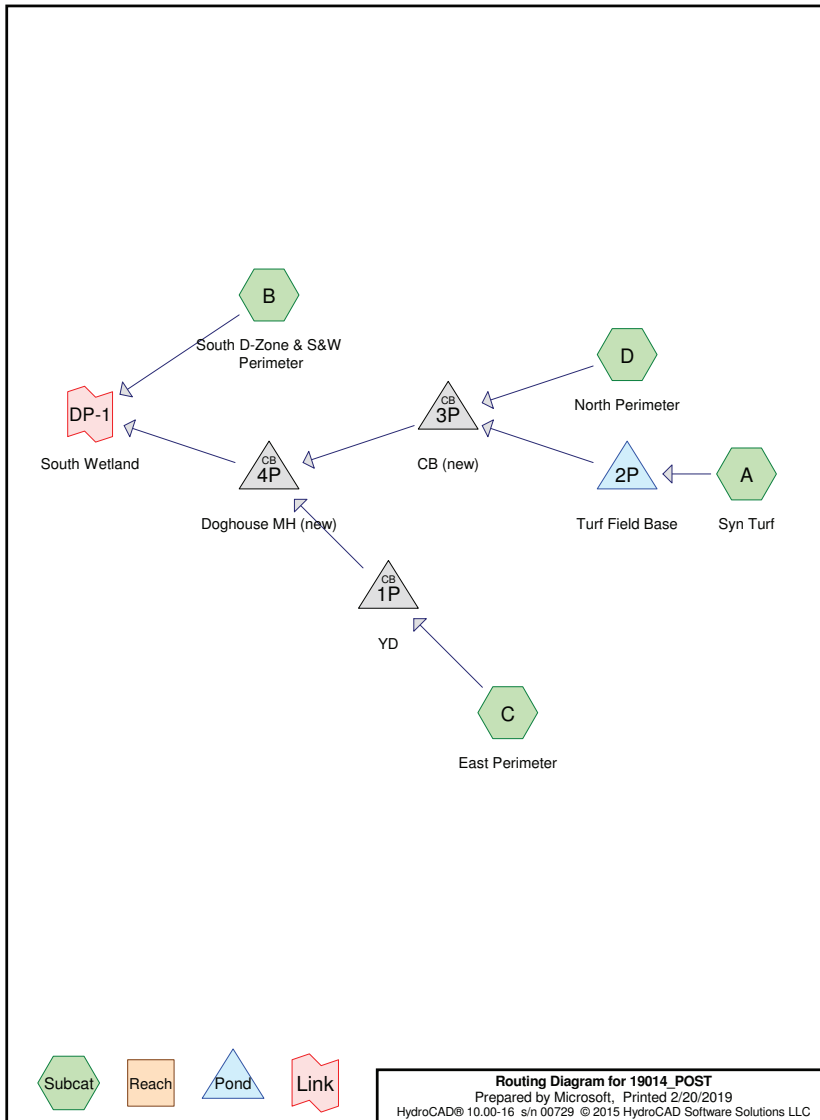
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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.717	79	50-75% Grass cover, Fair, HSG C (B, C, D)
0.176	98	Asphalt Pavement (B, C)
0.009	98	Roof (B)
0.480	98	Running Track (B)
2.343	98	Synthetic Turf (A)
5.725	89	TOTAL AREA



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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
2.717	HSG C	B, C, D
0.000	HSG D	
3.008	Other	A, B, C
5.725		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	2.717	0.000	0.000	2.717	50-75% Grass cover, Fair	B, C, D
0.000	0.000	0.000	0.000	0.176	0.176	Asphalt Pavement	B, C
0.000	0.000	0.000	0.000	0.009	0.009	Roof	B
0.000	0.000	0.000	0.000	0.480	0.480	Running Track	B
0.000	0.000	0.000	0.000	2.343	2.343	Synthetic Turf	A
0.000	0.000	2.717	0.000	3.008	5.725	TOTAL AREA	

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Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	C	0.00	0.00	396.0	0.0050	0.013	15.0	0.0	0.0
2	C	0.00	0.00	56.0	0.0050	0.013	24.0	0.0	0.0
3	C	0.00	0.00	143.0	0.0050	0.013	24.0	0.0	0.0
4	D	0.00	0.00	404.0	0.0050	0.013	18.0	0.0	0.0
5	D	0.00	0.00	35.0	0.0050	0.013	18.0	0.0	0.0
6	1P	96.02	95.70	55.0	0.0058	0.013	36.0	0.0	0.0
7	2P	97.28	97.10	35.0	0.0051	0.013	18.0	0.0	0.0
8	3P	97.01	95.64	137.0	0.0100	0.013	18.0	0.0	0.0
9	4P	95.70	94.96	126.0	0.0059	0.013	36.0	0.0	0.0

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Type III 24-hr 1-Year Storm Rainfall=2.60"

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Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Syn Turf Runoff Area=102,046 sf 100.00% Impervious Runoff Depth=2.37"
 Tc=5.0 min CN=98 Runoff=6.09 cfs 0.463 af

Subcatchment B: South D-Zone & S&W Runoff Area=73,634 sf 32.24% Impervious Runoff Depth=1.26"
 Flow Length=219' Tc=6.4 min CN=85 Runoff=2.45 cfs 0.177 af

Subcatchment C: East Perimeter Runoff Area=26,551 sf 19.75% Impervious Runoff Depth=1.13"
 Flow Length=655' Tc=8.7 min CN=83 Runoff=0.73 cfs 0.057 af

Subcatchment D: North Perimeter Runoff Area=47,135 sf 0.00% Impervious Runoff Depth=0.91"
 Flow Length=499' Tc=7.2 min CN=79 Runoff=1.06 cfs 0.082 af

Pond 1P: YD Peak Elev=96.37' Inflow=0.73 cfs 0.057 af
 36.0" Round Culvert n=0.013 L=55.0' S=0.0058 '/' Outflow=0.73 cfs 0.057 af

Pond 2P: Turf Field Base Peak Elev=103.56' Storage=17,040 cf Inflow=6.09 cfs 0.463 af
 Outflow=0.14 cfs 0.105 af

Pond 3P: CB (new) Peak Elev=97.53' Inflow=1.06 cfs 0.187 af
 18.0" Round Culvert n=0.013 L=137.0' S=0.0100 '/' Outflow=1.06 cfs 0.187 af

Pond 4P: Doghouse MH (new) Peak Elev=96.23' Inflow=1.78 cfs 0.244 af
 36.0" Round Culvert n=0.013 L=126.0' S=0.0059 '/' Outflow=1.78 cfs 0.244 af

Link DP-1: South Wetland Inflow=4.20 cfs 0.422 af
 Primary=4.20 cfs 0.422 af

Total Runoff Area = 5.725 ac Runoff Volume = 0.779 af Average Runoff Depth = 1.63"
47.45% Pervious = 2.717 ac 52.55% Impervious = 3.008 ac

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Type III 24-hr 1-Year Storm Rainfall=2.60"

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Summary for Subcatchment A: Syn Turf

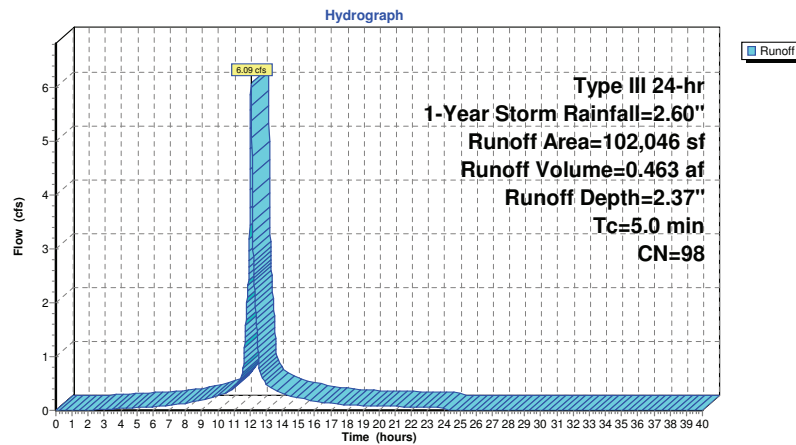
Runoff = 6.09 cfs @ 12.07 hrs, Volume= 0.463 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Storm Rainfall=2.60"

Area (sf)	CN	Description
* 102,046	98	Synthetic Turf
102,046		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Min. Tc

Subcatchment A: Syn Turf



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Summary for Subcatchment B: South D-Zone & S&W Perimeter

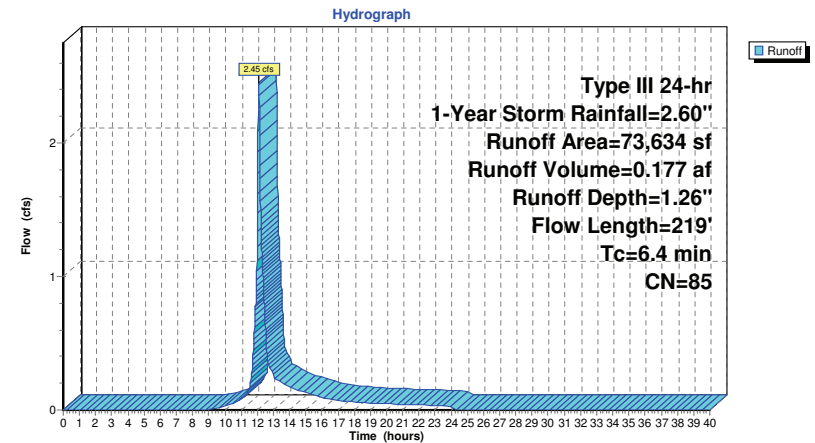
Runoff = 2.45 cfs @ 12.10 hrs, Volume= 0.177 af, Depth= 1.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Storm Rainfall=2.60"

Area (sf)	CN	Description
* 20,920	98	Running Track
* 403	98	Roof
* 2,419	98	Asphalt Pavement
49,892	79	50-75% Grass cover, Fair, HSG C
73,634	85	Weighted Average
49,892		67.76% Pervious Area
23,742		32.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	60	0.0290	0.18		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.2	32	0.0390	3.18		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.6	127	0.0420	3.30		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
6.4	219	Total			

Subcatchment B: South D-Zone & S&W Perimeter



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Type III 24-hr 1-Year Storm Rainfall=2.60"

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Summary for Subcatchment C: East Perimeter

Runoff = 0.73 cfs @ 12.13 hrs, Volume= 0.057 af, Depth= 1.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Storm Rainfall=2.60"

Area (sf)	CN	Description
5,244	98	Asphalt Pavement
21,307	79	50-75% Grass cover, Fair, HSG C
26,551	83	Weighted Average
21,307		80.25% Pervious Area
5,244		19.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	60	0.0230	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.8	396	0.0050	3.72	4.57	Pipe Channel, 15" RCP 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Concrete pipe, bends & connections
0.2	56	0.0050	5.09	16.00	Pipe Channel, 24" RCP 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
0.5	143	0.0050	5.09	16.00	Pipe Channel, 24" RCP 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
8.7	655	Total			

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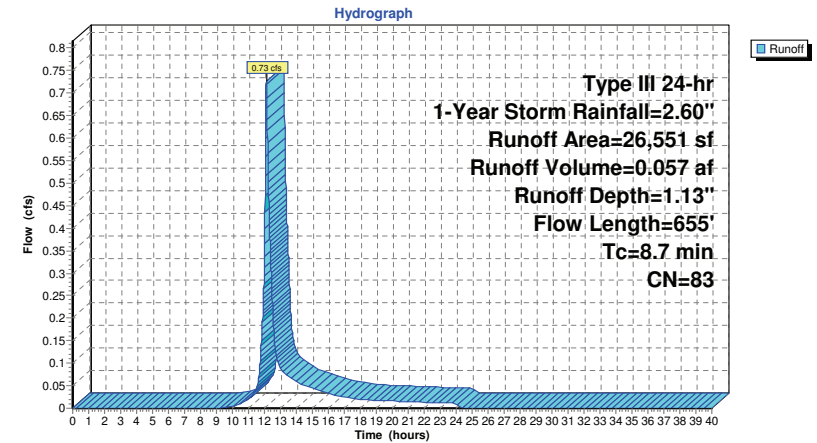
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Type III 24-hr 1-Year Storm Rainfall=2.60"

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Subcatchment C: East Perimeter

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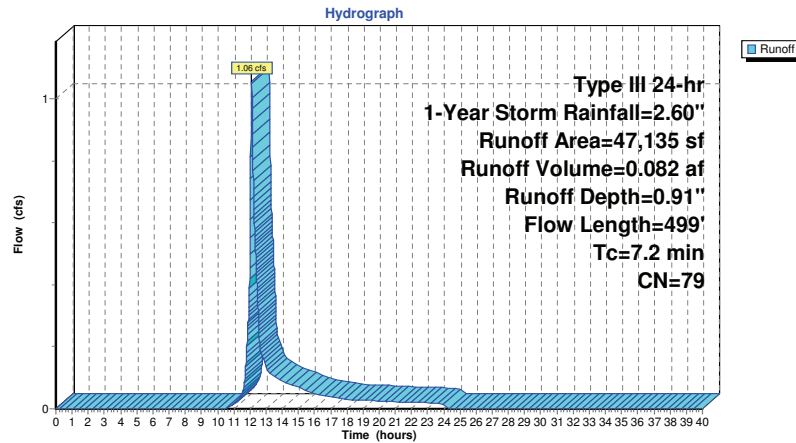
Summary for Subcatchment D: North Perimeter

Runoff = 1.06 cfs @ 12.11 hrs, Volume= 0.082 af, Depth= 0.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Storm Rainfall=2.60"

Area (sf)	CN	Description
47,135	79	50-75% Grass cover, Fair, HSG C
47,135		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	60	0.0300	0.18		Sheet Flow , Grass: Short n= 0.150 P2= 3.20"
1.6	404	0.0050	4.20	7.43	Pipe Channel, 18" HDPE Collector Pipe 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior
0.1	35	0.0050	4.20	7.43	Pipe Channel, 18" HDPE 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior
7.2	499	Total			

Subcatchment D: North Perimeter**19014 POST**

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Type III 24-hr 1-Year Storm Rainfall=2.60"

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Summary for Pond 1P: YDInflow Area = 0.610 ac, 19.75% Impervious, Inflow Depth = 1.13" for 1-Year Storm event
Inflow = 0.73 cfs @ 12.13 hrs, Volume= 0.057 af
Outflow = 0.73 cfs @ 12.13 hrs, Volume= 0.057 af, Atten= 0%, Lag= 0.0 min
Primary = 0.73 cfs @ 12.13 hrs, Volume= 0.057 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

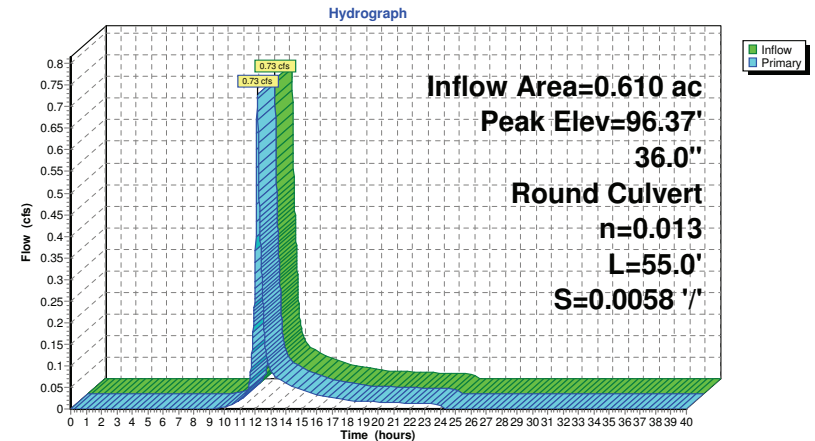
Peak Elev= 96.37' @ 12.13 hrs

Flood Elev= 103.97'

Device	Routing	Invert	Outlet Devices
#1	Primary	96.02'	36.0" Round 36" RCP L= 55.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 96.02' / 95.70' S= 0.0058 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 7.07 sf

Primary OutFlow Max=0.72 cfs @ 12.13 hrs HW=96.37' (Free Discharge)

1=36" RCP (Barrel Controls 0.72 cfs @ 2.42 fps)

Pond 1P: YD

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Type III 24-hr 1-Year Storm Rainfall=2.60"

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Summary for Pond 2P: Turf Field Base

Inflow Area = 2.343 ac, 100.00% Impervious, Inflow Depth = 2.37" for 1-Year Storm event
 Inflow = 6.09 cfs @ 12.07 hrs, Volume = 0.463 af
 Outflow = 0.14 cfs @ 16.82 hrs, Volume = 0.105 af, Atten = 98%, Lag = 284.7 min
 Primary = 0.14 cfs @ 16.82 hrs, Volume = 0.105 af

Routing by Stor-Ind method, Time Span = 0.00-40.00 hrs, dt = 0.01 hrs
 Peak Elev = 103.56' @ 16.82 hrs Surf. Area = 102,046 sf Storage = 17,040 cf

Plug-Flow detention time = 703.8 min calculated for 0.105 af (23% of inflow)
 Center-of-Mass det. time = 488.8 min (1,248.8 - 760.1)

Volume	Invert	Avail. Storage	Storage Description	
#1	103.00'	45,921 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf. Area (sq-ft)	Voids (%)	Inc. Store (cubic-feet)	Cum. Store (cubic-feet)
103.00	102,046	0.0	0	0
103.50	102,046	30.0	15,307	15,307
104.50	102,046	30.0	30,614	45,921

Device	Routing	Invert	Outlet Devices
#1	Primary	97.28'	18.0" Round 18" HDPE L = 35.0' CPP, projecting, no headwall, Ke = 0.900 Inlet / Outlet Invert = 97.28' / 97.10' S = 0.0051' S Cc = 0.900 n = 0.013 Corrugated PE, smooth interior, Flow Area = 1.77 sf
#2	Device 1	103.50'	4.0" Vert. Orifice/Grate X 17.00 C = 0.600

Primary OutFlow Max = 0.14 cfs @ 16.82 hrs HW = 103.56' (Free Discharge)

1=18" HDPE (Passes 0.14 cfs of 15.79 cfs potential flow)

2=Orifice/Grate (Orifice Controls 0.14 cfs @ 0.81 fps)

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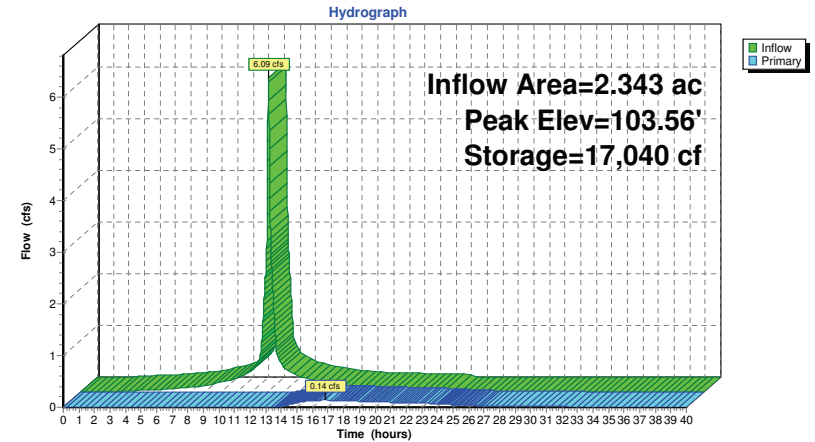
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Type III 24-hr 1-Year Storm Rainfall=2.60"

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Pond 2P: Turf Field Base

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Type III 24-hr 1-Year Storm Rainfall=2.60"

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Summary for Pond 3P: CB (new)

[79] Warning: Submerged Pond 2P Primary device # 1 INLET by 0.25'

Inflow Area = 3.425 ac, 68.40% Impervious, Inflow Depth > 0.65" for 1-Year Storm event
 Inflow = 1.06 cfs @ 12.11 hrs, Volume= 0.187 af
 Outflow = 1.06 cfs @ 12.11 hrs, Volume= 0.187 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.06 cfs @ 12.11 hrs, Volume= 0.187 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 97.53' @ 12.11 hrs

Flood Elev= 103.70'

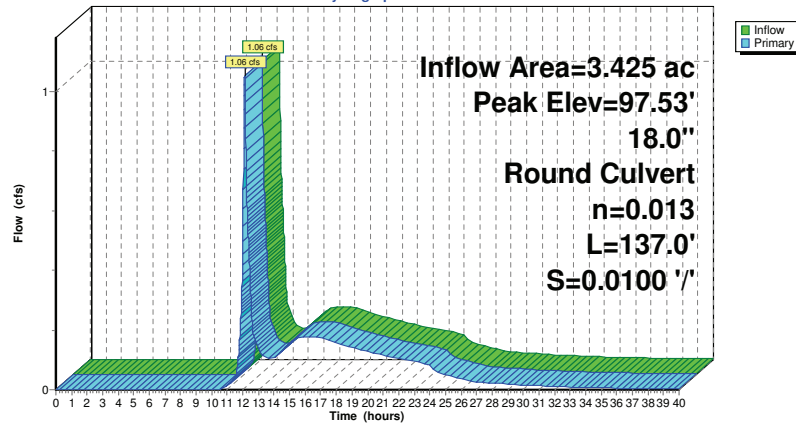
Device	Routing	Invert	Outlet Devices
#1	Primary	97.01'	18.0" Round 18" HDPE L= 137.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 97.01' / 95.64' S= 0.0100 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=1.05 cfs @ 12.11 hrs HW=97.53' (Free Discharge)

↑1=18" HDPE (Inlet Controls 1.05 cfs @ 1.94 fps)

Pond 3P: CB (new)

Hydrograph

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Summary for Pond 4P: Doghouse MH (new)

[79] Warning: Submerged Pond 1P Primary device # 1 INLET by 0.21'

[79] Warning: Submerged Pond 3P Primary device # 1 OUTLET by 0.59'

Inflow Area = 4.034 ac, 61.05% Impervious, Inflow Depth > 0.73" for 1-Year Storm event
 Inflow = 1.78 cfs @ 12.12 hrs, Volume= 0.244 af
 Outflow = 1.78 cfs @ 12.12 hrs, Volume= 0.244 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.78 cfs @ 12.12 hrs, Volume= 0.244 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 96.23' @ 12.12 hrs

Flood Elev= 103.97'

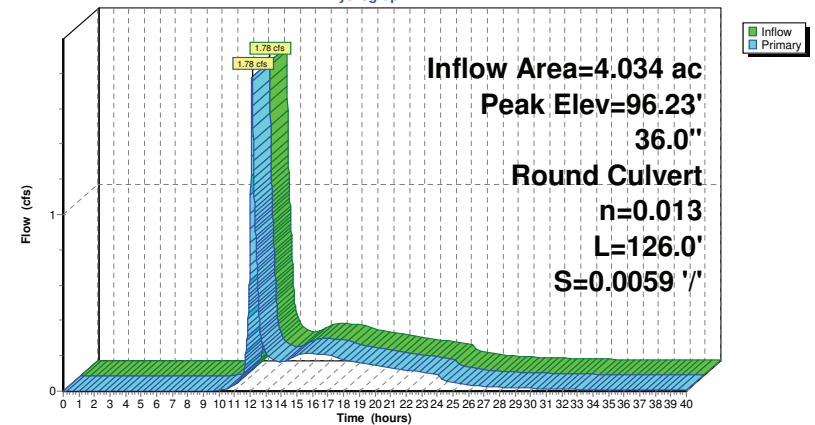
Device	Routing	Invert	Outlet Devices
#1	Primary	95.70'	36.0" Round 36" RCP L= 126.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 95.70' / 94.96' S= 0.0059 '/ Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 7.07 sf

Primary OutFlow Max=1.77 cfs @ 12.12 hrs HW=96.23' (Free Discharge)

↑1=36" RCP (Barrel Controls 1.77 cfs @ 3.19 fps)

Pond 4P: Doghouse MH (new)

Hydrograph



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Type III 24-hr 1-Year Storm Rainfall=2.60"

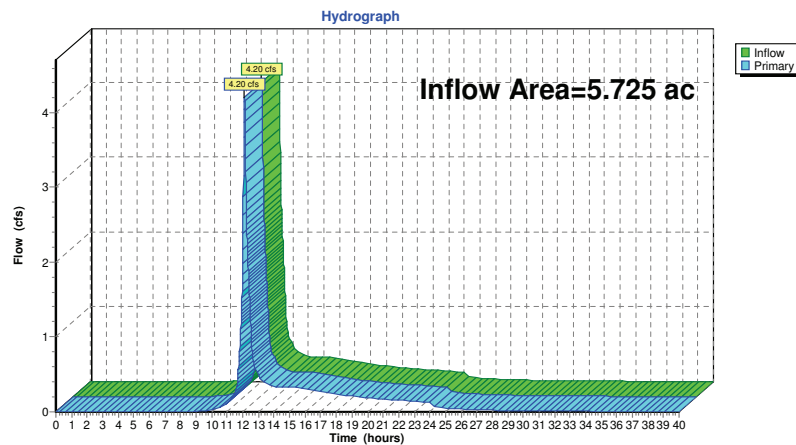
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Summary for Link DP-1: South Wetland

Inflow Area = 5.725 ac, 52.55% Impervious, Inflow Depth > 0.88" for 1-Year Storm event
Inflow = 4.20 cfs @ 12.10 hrs, Volume= 0.422 af
Primary = 4.20 cfs @ 12.10 hrs, Volume= 0.422 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link DP-1: South Wetland**19014_POST**

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Type III 24-hr 2-Year Storm Rainfall=3.20"

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Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Syn Turf Runoff Area=102,046 sf 100.00% Impervious Runoff Depth=2.97"
Tc=5.0 min CN=98 Runoff=7.54 cfs 0.579 af

Subcatchment B: South D-Zone & S&W Runoff Area=73,634 sf 32.24% Impervious Runoff Depth=1.76"
Flow Length=219' Tc=6.4 min CN=85 Runoff=3.44 cfs 0.248 af

Subcatchment C: East Perimeter Runoff Area=26,551 sf 19.75% Impervious Runoff Depth=1.61"
Flow Length=655' Tc=8.7 min CN=83 Runoff=1.05 cfs 0.082 af

Subcatchment D: North Perimeter Runoff Area=47,135 sf 0.00% Impervious Runoff Depth=1.34"
Flow Length=499' Tc=7.2 min CN=79 Runoff=1.60 cfs 0.121 af

Pond 1P: YD Peak Elev=96.44' Inflow=1.05 cfs 0.082 af
36.0" Round Culvert n=0.013 L=55.0' S=0.0058 '/' Outflow=1.05 cfs 0.082 af

Pond 2P: Turf Field Base Peak Elev=103.60' Storage=18,305 cf Inflow=7.54 cfs 0.579 af
Outflow=0.39 cfs 0.222 af

Pond 3P: CB (new) Peak Elev=97.66' Inflow=1.60 cfs 0.342 af
18.0" Round Culvert n=0.013 L=137.0' S=0.0100 '/' Outflow=1.60 cfs 0.342 af

Pond 4P: Doghouse MH (new) Peak Elev=96.35' Inflow=2.64 cfs 0.424 af
36.0" Round Culvert n=0.013 L=126.0' S=0.0059 '/' Outflow=2.64 cfs 0.424 af

Link DP-1: South Wetland Inflow=6.03 cfs 0.672 af
Primary=6.03 cfs 0.672 af

Total Runoff Area = 5.725 ac Runoff Volume = 1.029 af Average Runoff Depth = 2.16"
47.45% Pervious = 2.717 ac 52.55% Impervious = 3.008 ac

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Type III 24-hr 2-Year Storm Rainfall=3.20"

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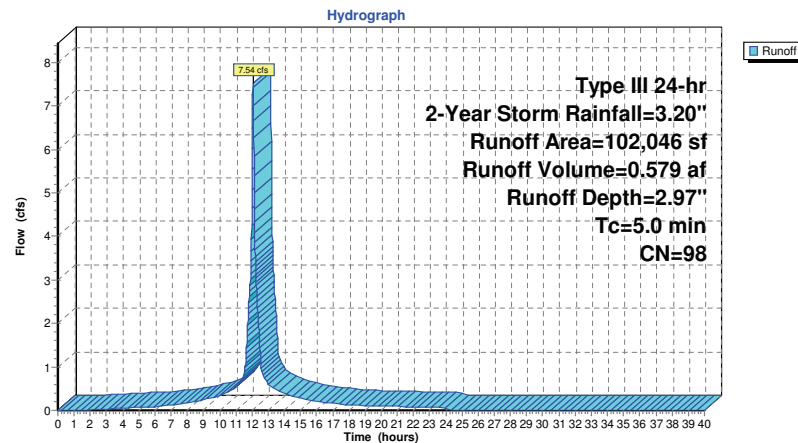
Summary for Subcatchment A: Syn Turf

Runoff = 7.54 cfs @ 12.07 hrs, Volume= 0.579 af, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
* 102,046	98	Synthetic Turf
102,046		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Min. Tc

Subcatchment A: Syn Turf**19014_POST**

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Type III 24-hr 2-Year Storm Rainfall=3.20"

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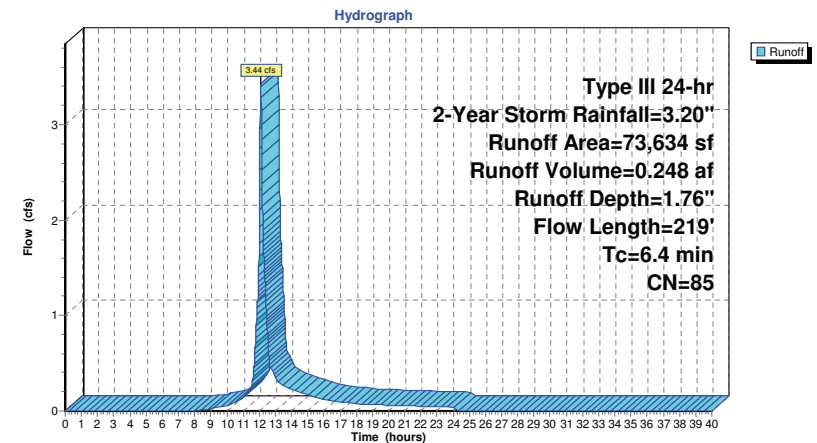
Summary for Subcatchment B: South D-Zone & S&W Perimeter

Runoff = 3.44 cfs @ 12.09 hrs, Volume= 0.248 af, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
* 20,920	98	Running Track
* 403	98	Roof
* 2,419	98	Asphalt Pavement
49,892	79	50-75% Grass cover, Fair, HSG C
73,634	85	Weighted Average
49,892		67.76% Pervious Area
23,742		32.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	60	0.0290	0.18		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.2	32	0.0390	3.18		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.6	127	0.0420	3.30		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
6.4	219	Total			

Subcatchment B: South D-Zone & S&W Perimeter

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Summary for Subcatchment C: East Perimeter

Runoff = 1.05 cfs @ 12.13 hrs, Volume= 0.082 af, Depth= 1.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
* 5,244	98	Asphalt Pavement
21,307	79	50-75% Grass cover, Fair, HSG C
26,551	83	Weighted Average
21,307		80.25% Pervious Area
5,244		19.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	60	0.0230	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.8	396	0.0050	3.72	4.57	Pipe Channel, 15" RCP 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Concrete pipe, bends & connections
0.2	56	0.0050	5.09	16.00	Pipe Channel, 24" RCP 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
0.5	143	0.0050	5.09	16.00	Pipe Channel, 24" RCP 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
8.7	655	Total			

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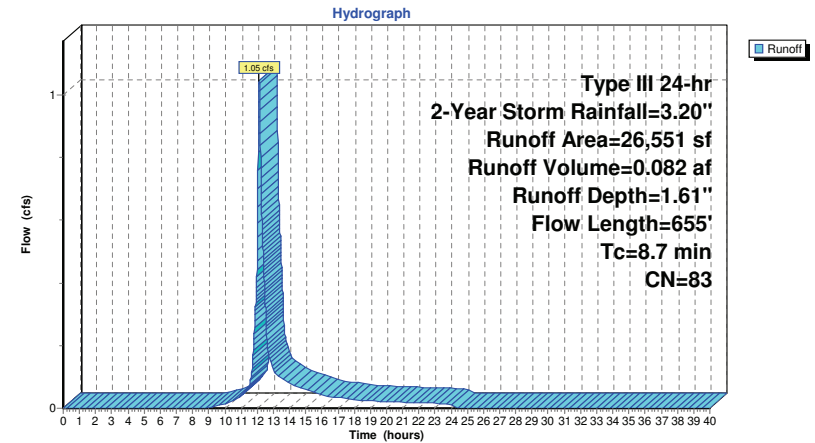
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Subcatchment C: East Perimeter

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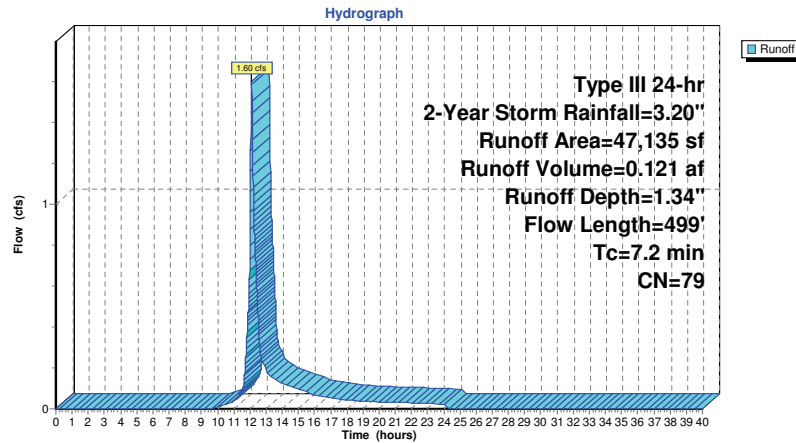
Summary for Subcatchment D: North Perimeter

Runoff = 1.60 cfs @ 12.11 hrs, Volume= 0.121 af, Depth= 1.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Storm Rainfall=3.20"

Area (sf)	CN	Description
47,135	79	50-75% Grass cover, Fair, HSG C
47,135		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	60	0.0300	0.18		Sheet Flow , Grass: Short n= 0.150 P2= 3.20"
1.6	404	0.0050	4.20	7.43	Pipe Channel, 18" HDPE Collector Pipe 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior
0.1	35	0.0050	4.20	7.43	Pipe Channel, 18" HDPE 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior
7.2	499	Total			

Subcatchment D: North Perimeter**19014_POST**

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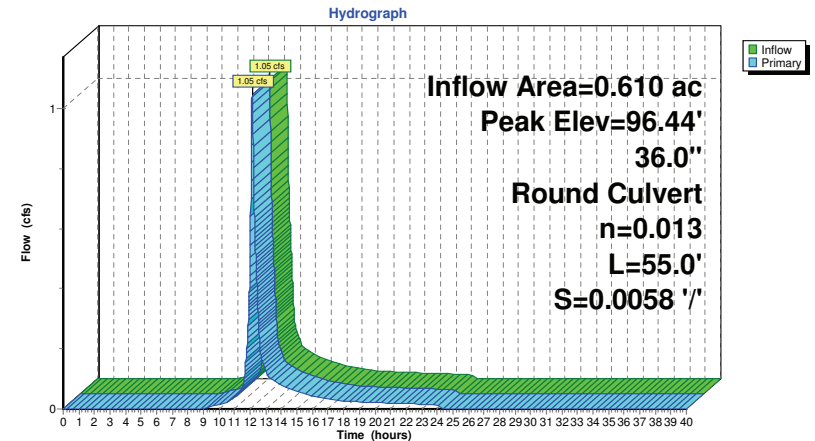
Type III 24-hr 2-Year Storm Rainfall=3.20"

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Summary for Pond 1P: YDInflow Area = 0.610 ac, 19.75% Impervious, Inflow Depth = 1.61" for 2-Year Storm event
Inflow = 1.05 cfs @ 12.13 hrs, Volume= 0.082 af
Outflow = 1.05 cfs @ 12.13 hrs, Volume= 0.082 af, Atten= 0%, Lag= 0.0 min
Primary = 1.05 cfs @ 12.13 hrs, Volume= 0.082 afRouting by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 96.44' @ 12.13 hrs
Flood Elev= 103.97'

Device	Routing	Invert	Outlet Devices
#1	Primary	96.02'	36.0" Round 36" RCP L= 55.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 96.02' / 95.70' S= 0.0058 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 7.07 sf

Primary OutFlow Max=1.04 cfs @ 12.13 hrs HW=96.44' (Free Discharge)
1=36" RCP (Barrel Controls 1.04 cfs @ 2.66 fps)**Pond 1P: YD**

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Type III 24-hr 2-Year Storm Rainfall=3.20"

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Summary for Pond 2P: Turf Field Base

Inflow Area = 2.343 ac, 100.00% Impervious, Inflow Depth = 2.97" for 2-Year Storm event
 Inflow = 7.54 cfs @ 12.07 hrs, Volume= 0.579 af
 Outflow = 0.39 cfs @ 13.97 hrs, Volume= 0.222 af, Atten= 95%, Lag= 113.8 min
 Primary = 0.39 cfs @ 13.97 hrs, Volume= 0.222 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 103.60' @ 13.97 hrs Surf.Area= 102,046 sf Storage= 18,305 cf

Plug-Flow detention time= 482.4 min calculated for 0.222 af (38% of inflow)
 Center-of-Mass det. time= 329.2 min (1,084.7 - 755.5)

Volume	Invert	Avail.Storage	Storage Description	
#1	103.00'	45,921 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
103.00	102,046	0.0	0	0
103.50	102,046	30.0	15,307	15,307
104.50	102,046	30.0	30,614	45,921

Device	Routing	Invert	Outlet Devices
#1	Primary	97.28'	18.0" Round 18" HDPE L= 35.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 97.28' / 97.10' S= 0.0051 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	103.50'	4.0" Vert. Orifice/Grate X 17.00 C= 0.600

Primary OutFlow Max=0.39 cfs @ 13.97 hrs HW=103.60' (Free Discharge)

1=18" HDPE (Passes 0.39 cfs of 15.85 cfs potential flow)

2=Orifice/Grate (Orifice Controls 0.39 cfs @ 1.07 fps)

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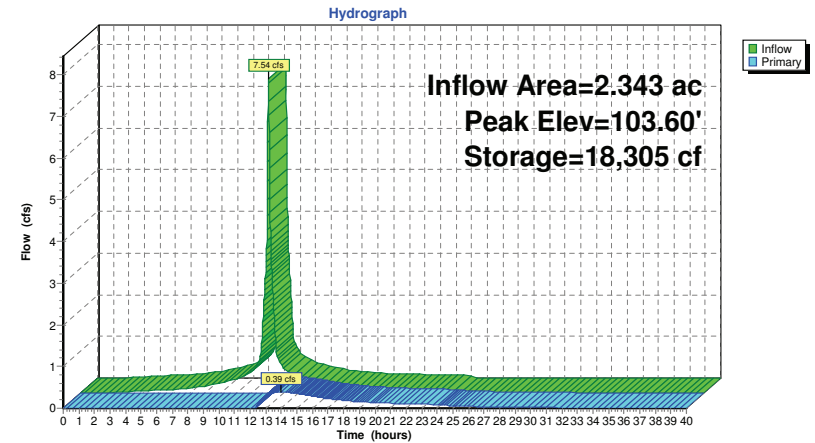
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Pond 2P: Turf Field Base

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Summary for Pond 3P: CB (new)

[79] Warning: Submerged Pond 2P Primary device # 1 INLET by 0.38'

Inflow Area = 3.425 ac, 68.40% Impervious, Inflow Depth > 1.20" for 2-Year Storm event
Inflow = 1.60 cfs @ 12.11 hrs, Volume= 0.342 af
Outflow = 1.60 cfs @ 12.11 hrs, Volume= 0.342 af, Atten= 0%, Lag= 0.0 min
Primary = 1.60 cfs @ 12.11 hrs, Volume= 0.342 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 97.66' @ 12.11 hrs

Flood Elev= 103.70'

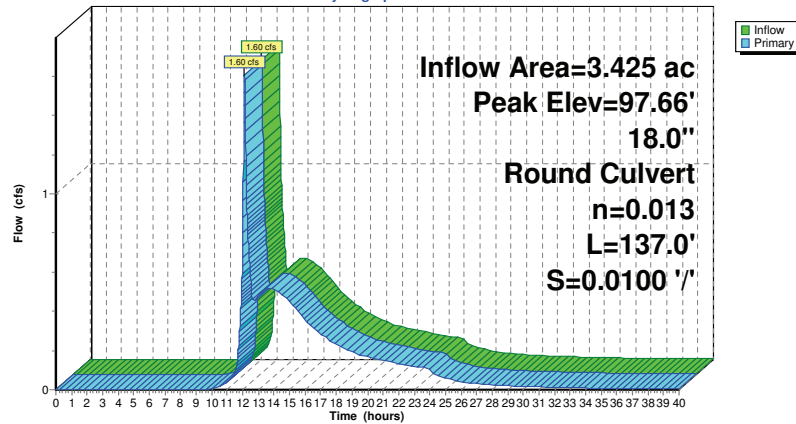
Device	Routing	Invert	Outlet Devices
#1	Primary	97.01'	18.0" Round 18" HDPE L= 137.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 97.01' / 95.64' S= 0.0100 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=1.60 cfs @ 12.11 hrs HW=97.66' (Free Discharge)

↑1=18" HDPE (Inlet Controls 1.60 cfs @ 2.17 fps)

Pond 3P: CB (new)

Hydrograph

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Type III 24-hr 2-Year Storm Rainfall=3.20"

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Summary for Pond 4P: Doghouse MH (new)

[79] Warning: Submerged Pond 1P Primary device # 1 INLET by 0.33'

[79] Warning: Submerged Pond 3P Primary device # 1 OUTLET by 0.71'

Inflow Area = 4.034 ac, 61.05% Impervious, Inflow Depth > 1.26" for 2-Year Storm event
Inflow = 2.64 cfs @ 12.11 hrs, Volume= 0.424 af
Outflow = 2.64 cfs @ 12.11 hrs, Volume= 0.424 af, Atten= 0%, Lag= 0.0 min
Primary = 2.64 cfs @ 12.11 hrs, Volume= 0.424 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 96.35' @ 12.11 hrs

Flood Elev= 103.97'

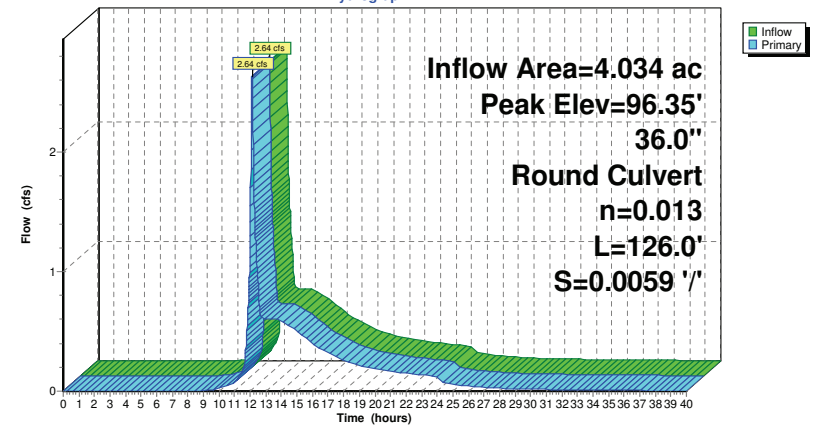
Device	Routing	Invert	Outlet Devices
#1	Primary	95.70'	36.0" Round 36" RCP L= 126.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 95.70' / 94.96' S= 0.0059 '/ Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 7.07 sf

Primary OutFlow Max=2.63 cfs @ 12.11 hrs HW=96.35' (Free Discharge)

↑1=36" RCP (Barrel Controls 2.63 cfs @ 3.54 fps)

Pond 4P: Doghouse MH (new)

Hydrograph



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Type III 24-hr 2-Year Storm Rainfall=3.20"

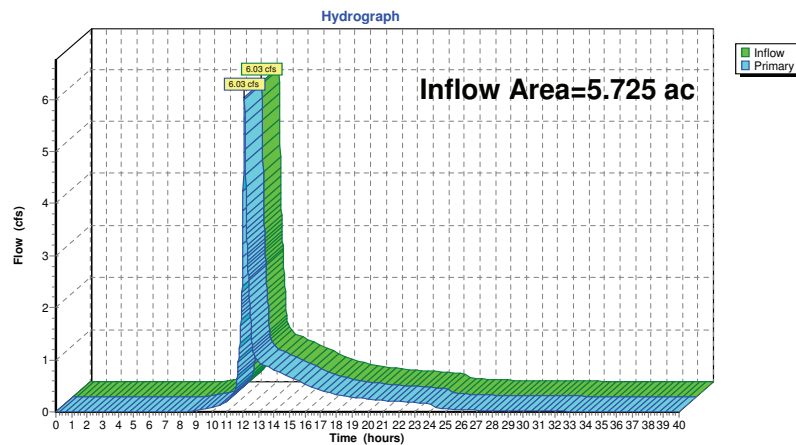
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Summary for Link DP-1: South Wetland

Inflow Area = 5.725 ac, 52.55% Impervious, Inflow Depth > 1.41" for 2-Year Storm event
Inflow = 6.03 cfs @ 12.10 hrs, Volume= 0.672 af
Primary = 6.03 cfs @ 12.10 hrs, Volume= 0.672 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link DP-1: South Wetland**19014_POST**

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Type III 24-hr 10-Year Storm Rainfall=4.70"

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Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Syn Turf Runoff Area=102,046 sf 100.00% Impervious Runoff Depth=4.46"
Tc=5.0 min CN=98 Runoff=11.15 cfs 0.871 af

Subcatchment B: South D-Zone & S&W Runoff Area=73,634 sf 32.24% Impervious Runoff Depth=3.09"
Flow Length=219' Tc=6.4 min CN=85 Runoff=6.00 cfs 0.436 af

Subcatchment C: East Perimeter Runoff Area=26,551 sf 19.75% Impervious Runoff Depth=2.90"
Flow Length=655' Tc=8.7 min CN=83 Runoff=1.89 cfs 0.148 af

Subcatchment D: North Perimeter Runoff Area=47,135 sf 0.00% Impervious Runoff Depth=2.55"
Flow Length=499' Tc=7.2 min CN=79 Runoff=3.10 cfs 0.230 af

Pond 1P: YD Peak Elev=96.59' Inflow=1.89 cfs 0.148 af
36.0" Round Culvert n=0.013 L=55.0' S=0.0058 '/' Outflow=1.89 cfs 0.148 af

Pond 2P: Turf Field Base Peak Elev=103.76' Storage=23,136 cf Inflow=11.15 cfs 0.871 af
Outflow=2.10 cfs 0.514 af

Pond 3P: CB (new) Peak Elev=98.09' Inflow=3.82 cfs 0.743 af
18.0" Round Culvert n=0.013 L=137.0' S=0.0100 '/' Outflow=3.82 cfs 0.743 af

Pond 4P: Doghouse MH (new) Peak Elev=96.67' Inflow=5.70 cfs 0.891 af
36.0" Round Culvert n=0.013 L=126.0' S=0.0059 '/' Outflow=5.70 cfs 0.891 af

Link DP-1: South Wetland Inflow=11.48 cfs 1.326 af
Primary=11.48 cfs 1.326 af

Total Runoff Area = 5.725 ac Runoff Volume = 1.684 af Average Runoff Depth = 3.53"
47.45% Pervious = 2.717 ac 52.55% Impervious = 3.008 ac

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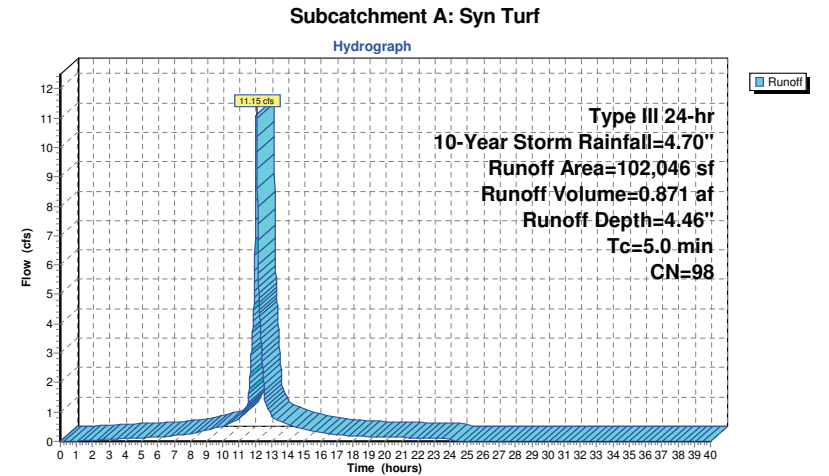
Summary for Subcatchment A: Syn Turf

Runoff = 11.15 cfs @ 12.07 hrs, Volume= 0.871 af, Depth= 4.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
* 102,046	98	Synthetic Turf
102,046		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Min. Tc



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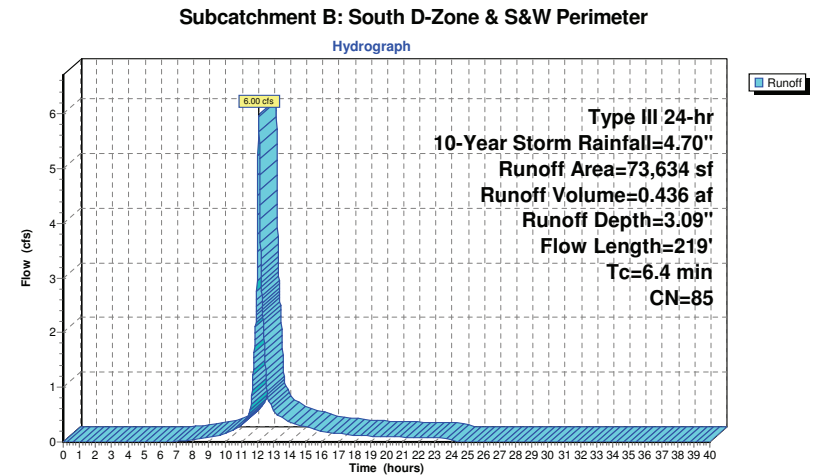
Summary for Subcatchment B: South D-Zone & S&W Perimeter

Runoff = 6.00 cfs @ 12.09 hrs, Volume= 0.436 af, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
* 20,920	98	Running Track
* 403	98	Roof
* 2,419	98	Asphalt Pavement
49,892	79	50-75% Grass cover, Fair, HSG C
73,634	85	Weighted Average
49,892		67.76% Pervious Area
23,742		32.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	60	0.0290	0.18		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.2	32	0.0390	3.18		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.6	127	0.0420	3.30		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
6.4	219	Total			



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Summary for Subcatchment C: East Perimeter

Runoff = 1.89 cfs @ 12.12 hrs, Volume= 0.148 af, Depth= 2.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
* 5,244	98	Asphalt Pavement
21,307	79	50-75% Grass cover, Fair, HSG C
26,551	83	Weighted Average
21,307		80.25% Pervious Area
5,244		19.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	60	0.0230	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.8	396	0.0050	3.72	4.57	Pipe Channel, 15" RCP 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Concrete pipe, bends & connections
0.2	56	0.0050	5.09	16.00	Pipe Channel, 24" RCP 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
0.5	143	0.0050	5.09	16.00	Pipe Channel, 24" RCP 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
8.7	655	Total			

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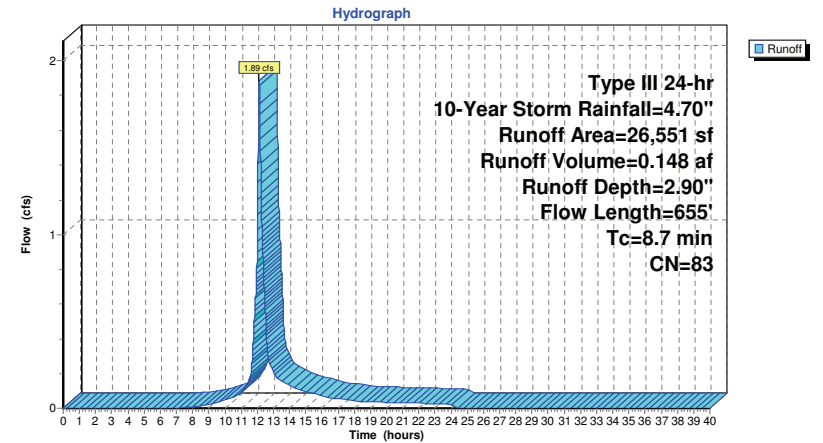
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Type III 24-hr 10-Year Storm Rainfall=4.70"

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Subcatchment C: East Perimeter

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Type III 24-hr 10-Year Storm Rainfall=4.70"

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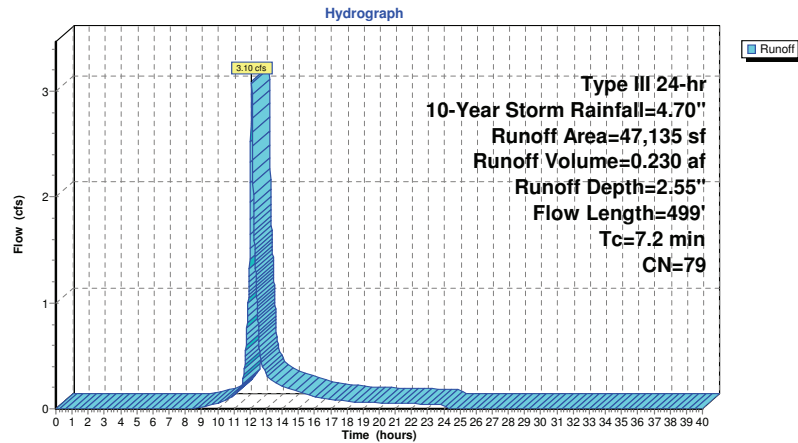
Summary for Subcatchment D: North Perimeter

Runoff = 3.10 cfs @ 12.10 hrs, Volume= 0.230 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Storm Rainfall=4.70"

Area (sf)	CN	Description
47,135	79	50-75% Grass cover, Fair, HSG C
47,135		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	60	0.0300	0.18		Sheet Flow , Grass: Short n= 0.150 P2= 3.20"
1.6	404	0.0050	4.20	7.43	Pipe Channel, 18" HDPE Collector Pipe 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior
0.1	35	0.0050	4.20	7.43	Pipe Channel, 18" HDPE 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior
7.2	499	Total			

Subcatchment D: North Perimeter**19014_POST**

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Type III 24-hr 10-Year Storm Rainfall=4.70"

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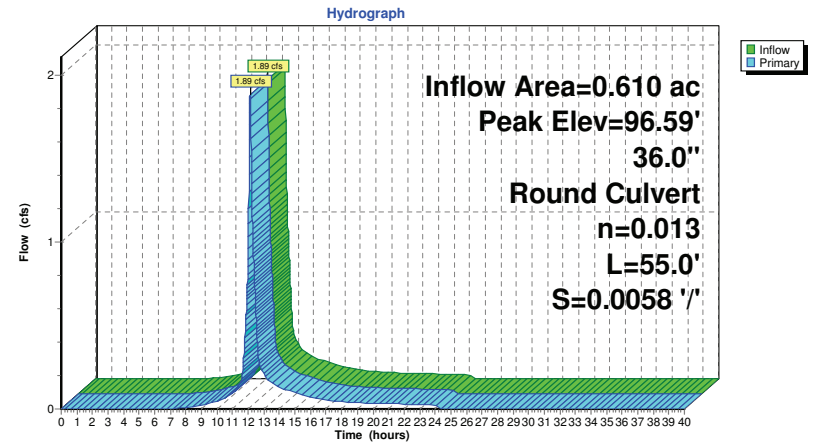
Summary for Pond 1P: YD

Inflow Area = 0.610 ac, 19.75% Impervious, Inflow Depth = 2.90" for 10-Year Storm event
 Inflow = 1.89 cfs @ 12.12 hrs, Volume= 0.148 af
 Outflow = 1.89 cfs @ 12.12 hrs, Volume= 0.148 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.89 cfs @ 12.12 hrs, Volume= 0.148 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 96.59' @ 12.12 hrs
 Flood Elev= 103.97'

Device	Routing	Invert	Outlet Devices
#1	Primary	96.02'	36.0" Round 36" RCP L= 55.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 96.02' / 95.70' S= 0.0058 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 7.07 sf

Primary OutFlow Max=1.88 cfs @ 12.12 hrs HW=96.58' (Free Discharge)
 1=36" RCP (Barrel Controls 1.88 cfs @ 3.09 fps)

Pond 1P: YD

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Type III 24-hr 10-Year Storm Rainfall=4.70"

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Summary for Pond 2P: Turf Field Base

Inflow Area = 2.343 ac, 100.00% Impervious, Inflow Depth = 4.46" for 10-Year Storm event
 Inflow = 11.15 cfs @ 12.07 hrs, Volume= 0.871 af
 Outflow = 2.10 cfs @ 12.50 hrs, Volume= 0.514 af, Atten= 81%, Lag= 25.6 min
 Primary = 2.10 cfs @ 12.50 hrs, Volume= 0.514 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 103.76' @ 12.50 hrs Surf.Area= 102,046 sf Storage= 23,136 cf

Plug-Flow detention time= 322.4 min calculated for 0.513 af (59% of inflow)
 Center-of-Mass det. time= 210.6 min (958.7 - 748.1)

Volume	Invert	Avail.Storage	Storage Description	
#1	103.00'	45,921 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
103.00	102,046	0.0	0	0
103.50	102,046	30.0	15,307	15,307
104.50	102,046	30.0	30,614	45,921

Device	Routing	Invert	Outlet Devices
#1	Primary	97.28'	18.0" Round 18" HDPE L= 35.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 97.28' / 97.10' S= 0.0051 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	103.50'	4.0" Vert. Orifice/Grate X 17.00 C= 0.600

Primary OutFlow Max=2.10 cfs @ 12.50 hrs HW=103.76' (Free Discharge)

1=18" HDPE (Passes 2.10 cfs of 16.07 cfs potential flow)

2=Orifice/Grate (Orifice Controls 2.10 cfs @ 1.72 fps)

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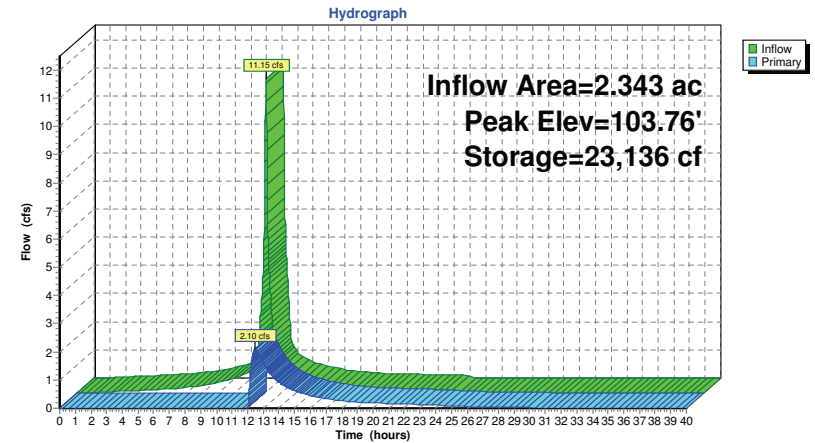
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Type III 24-hr 10-Year Storm Rainfall=4.70"

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Pond 2P: Turf Field Base

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Type III 24-hr 10-Year Storm Rainfall=4.70"

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Summary for Pond 3P: CB (new)

[79] Warning: Submerged Pond 2P Primary device # 1 INLET by 0.81'

Inflow Area = 3.425 ac, 68.40% Impervious, Inflow Depth > 2.60" for 10-Year Storm event
Inflow = 3.82 cfs @ 12.13 hrs, Volume= 0.743 af
Outflow = 3.82 cfs @ 12.13 hrs, Volume= 0.743 af, Atten= 0%, Lag= 0.0 min
Primary = 3.82 cfs @ 12.13 hrs, Volume= 0.743 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 98.09' @ 12.13 hrs

Flood Elev= 103.70'

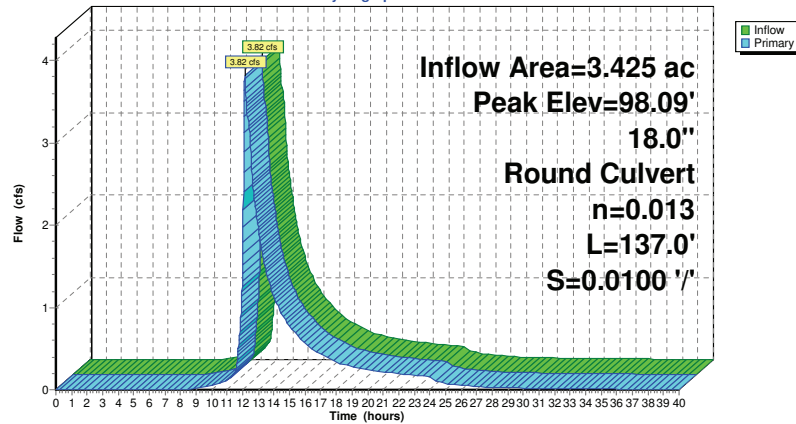
Device	Routing	Invert	Outlet Devices
#1	Primary	97.01'	18.0" Round 18" HDPE L= 137.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 97.01' / 95.64' S= 0.0100 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=3.82 cfs @ 12.13 hrs HW=98.09' (Free Discharge)

↑1=18" HDPE (Inlet Controls 3.82 cfs @ 2.80 fps)

Pond 3P: CB (new)

Hydrograph

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Type III 24-hr 10-Year Storm Rainfall=4.70"

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Summary for Pond 4P: Doghouse MH (new)

[81] Warning: Exceeded Pond 1P by 0.13' @ 12.51 hrs

[79] Warning: Submerged Pond 3P Primary device # 1 OUTLET by 1.03'

Inflow Area = 4.034 ac, 61.05% Impervious, Inflow Depth > 2.65" for 10-Year Storm event
Inflow = 5.70 cfs @ 12.13 hrs, Volume= 0.891 af
Outflow = 5.70 cfs @ 12.13 hrs, Volume= 0.891 af, Atten= 0%, Lag= 0.0 min
Primary = 5.70 cfs @ 12.13 hrs, Volume= 0.891 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 96.67' @ 12.13 hrs

Flood Elev= 103.97'

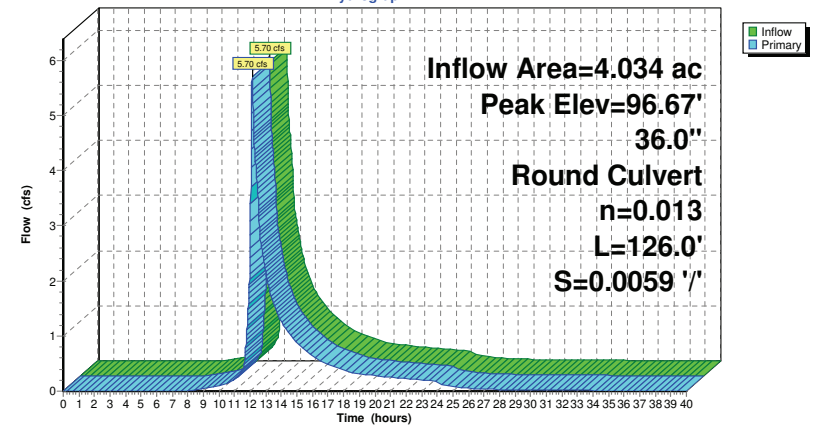
Device	Routing	Invert	Outlet Devices
#1	Primary	95.70'	36.0" Round 36" RCP L= 126.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 95.70' / 94.96' S= 0.0059 '/ Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 7.07 sf

Primary OutFlow Max=5.69 cfs @ 12.13 hrs HW=96.67' (Free Discharge)

↑1=36" RCP (Barrel Controls 5.69 cfs @ 4.30 fps)

Pond 4P: Doghouse MH (new)

Hydrograph



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Type III 24-hr 10-Year Storm Rainfall=4.70"

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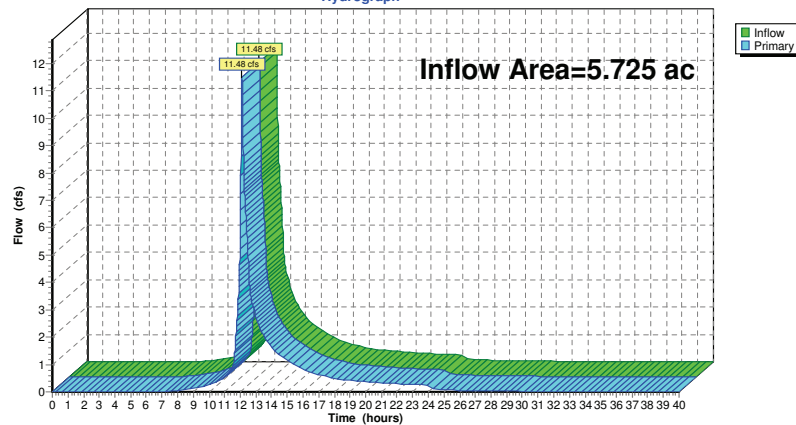
Summary for Link DP-1: South Wetland

Inflow Area = 5.725 ac, 52.55% Impervious, Inflow Depth > 2.78" for 10-Year Storm event
Inflow = 11.48 cfs @ 12.11 hrs, Volume= 1.326 af
Primary = 11.48 cfs @ 12.11 hrs, Volume= 1.326 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link DP-1: South Wetland

Hydrograph

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Type III 24-hr 25-Year Storm Rainfall=5.50"

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Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Syn Turf Runoff Area=102,046 sf 100.00% Impervious Runoff Depth=5.26"
Tc=5.0 min CN=98 Runoff=13.07 cfs 1.027 af

Subcatchment B: South D-Zone & S&W Runoff Area=73,634 sf 32.24% Impervious Runoff Depth=3.83"
Flow Length=219' Tc=6.4 min CN=85 Runoff=7.38 cfs 0.540 af

Subcatchment C: East Perimeter Runoff Area=26,551 sf 19.75% Impervious Runoff Depth=3.63"
Flow Length=655' Tc=8.7 min CN=83 Runoff=2.35 cfs 0.184 af

Subcatchment D: North Perimeter Runoff Area=47,135 sf 0.00% Impervious Runoff Depth=3.24"
Flow Length=499' Tc=7.2 min CN=79 Runoff=3.94 cfs 0.292 af

Pond 1P: YD Peak Elev=96.65' Inflow=2.35 cfs 0.184 af
36.0" Round Culvert n=0.013 L=55.0' S=0.0058 '/' Outflow=2.35 cfs 0.184 af

Pond 2P: Turf Field Base Peak Elev=103.85' Storage=25,937 cf Inflow=13.07 cfs 1.027 af
Outflow=3.03 cfs 0.669 af

Pond 3P: CB (new) Peak Elev=98.52' Inflow=5.87 cfs 0.961 af
18.0" Round Culvert n=0.013 L=137.0' S=0.0100 '/' Outflow=5.87 cfs 0.961 af

Pond 4P: Doghouse MH (new) Peak Elev=96.88' Inflow=8.21 cfs 1.146 af
36.0" Round Culvert n=0.013 L=126.0' S=0.0059 '/' Outflow=8.21 cfs 1.146 af

Link DP-1: South Wetland Inflow=15.31 cfs 1.686 af
Primary=15.31 cfs 1.686 af

Total Runoff Area = 5.725 ac Runoff Volume = 2.044 af Average Runoff Depth = 4.28"
47.45% Pervious = 2.717 ac 52.55% Impervious = 3.008 ac

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Type III 24-hr 25-Year Storm Rainfall=5.50"

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Summary for Subcatchment A: Syn Turf

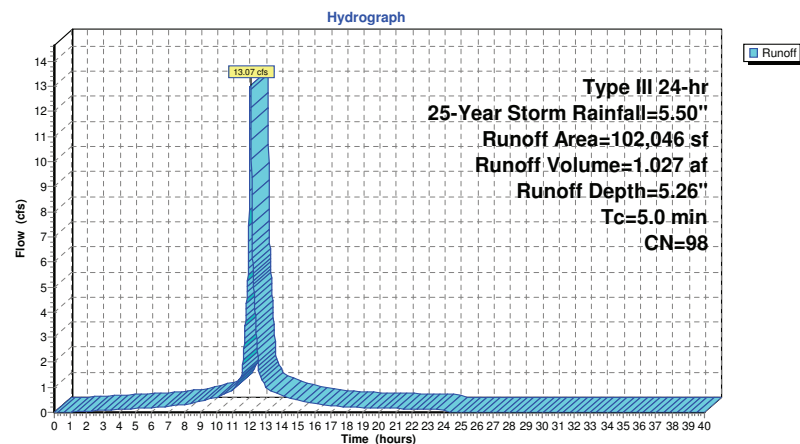
Runoff = 13.07 cfs @ 12.07 hrs, Volume= 1.027 af, Depth= 5.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
* 102,046	98	Synthetic Turf
102,046		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Min. Tc

Subcatchment A: Syn Turf



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Type III 24-hr 25-Year Storm Rainfall=5.50"

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Summary for Subcatchment B: South D-Zone & S&W Perimeter

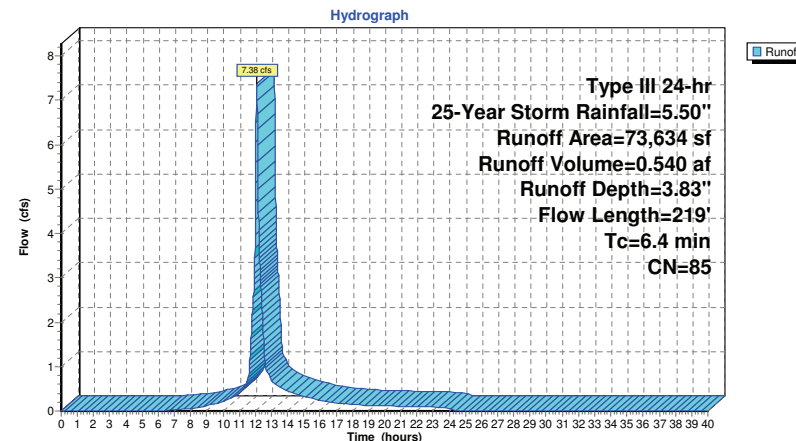
Runoff = 7.38 cfs @ 12.09 hrs, Volume= 0.540 af, Depth= 3.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
* 20,920	98	Running Track
* 403	98	Roof
* 2,419	98	Asphalt Pavement
49,892	79	50-75% Grass cover, Fair, HSG C
73,634	85	Weighted Average
49,892		67.76% Pervious Area
23,742		32.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	60	0.0290	0.18		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.2	32	0.0390	3.18		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.6	127	0.0420	3.30		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
6.4	219	Total			

Subcatchment B: South D-Zone & S&W Perimeter



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Type III 24-hr 25-Year Storm Rainfall=5.50"

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Summary for Subcatchment C: East Perimeter

Runoff = 2.35 cfs @ 12.12 hrs, Volume= 0.184 af, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
5,244	98	Asphalt Pavement
21,307	79	50-75% Grass cover, Fair, HSG C
26,551	83	Weighted Average
21,307		80.25% Pervious Area
5,244		19.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	60	0.0230	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.8	396	0.0050	3.72	4.57	Pipe Channel, 15" RCP 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Concrete pipe, bends & connections
0.2	56	0.0050	5.09	16.00	Pipe Channel, 24" RCP 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
0.5	143	0.0050	5.09	16.00	Pipe Channel, 24" RCP 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
8.7	655	Total			

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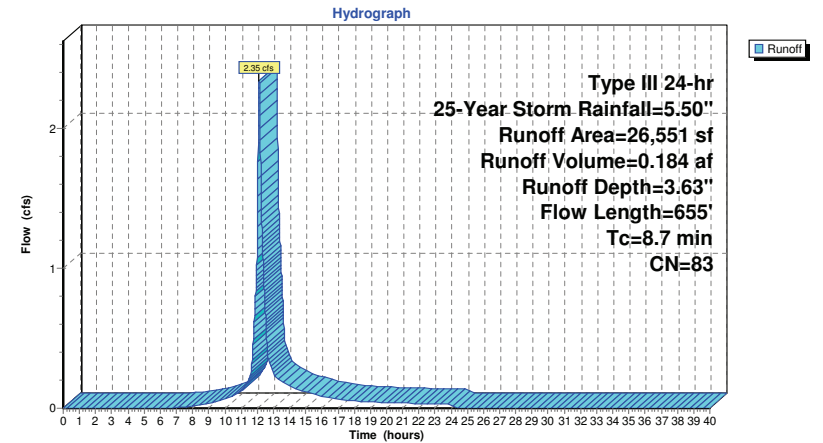
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Type III 24-hr 25-Year Storm Rainfall=5.50"

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Subcatchment C: East Perimeter



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Type III 24-hr 25-Year Storm Rainfall=5.50"

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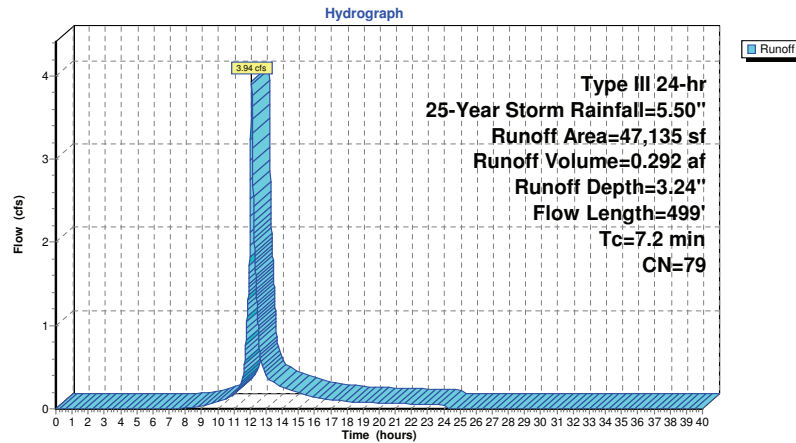
Summary for Subcatchment D: North Perimeter

Runoff = 3.94 cfs @ 12.10 hrs, Volume= 0.292 af, Depth= 3.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Storm Rainfall=5.50"

Area (sf)	CN	Description
47,135	79	50-75% Grass cover, Fair, HSG C
47,135		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	60	0.0300	0.18		Sheet Flow , Grass: Short n= 0.150 P2= 3.20"
1.6	404	0.0050	4.20	7.43	Pipe Channel, 18" HDPE Collector Pipe 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior
0.1	35	0.0050	4.20	7.43	Pipe Channel, 18" HDPE 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior
7.2	499	Total			

Subcatchment D: North Perimeter**19014_POST**

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Type III 24-hr 25-Year Storm Rainfall=5.50"

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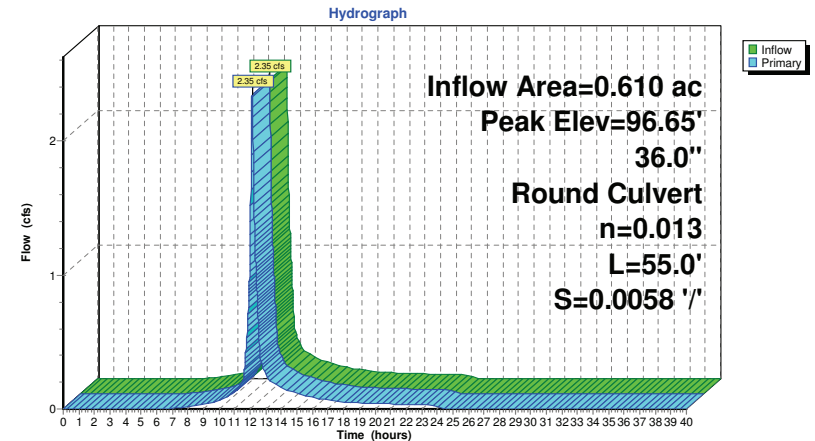
Summary for Pond 1P: YD

Inflow Area = 0.610 ac, 19.75% Impervious, Inflow Depth = 3.63" for 25-Year Storm event
 Inflow = 2.35 cfs @ 12.12 hrs, Volume= 0.184 af
 Outflow = 2.35 cfs @ 12.12 hrs, Volume= 0.184 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.35 cfs @ 12.12 hrs, Volume= 0.184 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 96.65' @ 12.12 hrs
 Flood Elev= 103.97'

Device	Routing	Invert	Outlet Devices
#1	Primary	96.02'	36.0" Round 36" RCP L= 55.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 96.02' / 95.70' S= 0.0058 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 7.07 sf

Primary OutFlow Max=2.34 cfs @ 12.12 hrs HW=96.65' (Free Discharge)
 1=36" RCP (Barrel Controls 2.34 cfs @ 3.26 fps)

Pond 1P: YD

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Type III 24-hr 25-Year Storm Rainfall=5.50"

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Summary for Pond 2P: Turf Field Base

Inflow Area = 2.343 ac, 100.00% Impervious, Inflow Depth = 5.26" for 25-Year Storm event
 Inflow = 13.07 cfs @ 12.07 hrs, Volume= 1.027 af
 Outflow = 3.03 cfs @ 12.45 hrs, Volume= 0.669 af, Atten= 77%, Lag= 22.6 min
 Primary = 3.03 cfs @ 12.45 hrs, Volume= 0.669 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 103.85' @ 12.45 hrs Surf.Area= 102,046 sf Storage= 25,937 cf

Plug-Flow detention time= 290.2 min calculated for 0.669 af (65% of inflow)

Center-of-Mass det. time= 187.5 min (933.1 - 745.5)

Volume	Invert	Avail.Storage	Storage Description	
#1	103.00'	45,921 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
103.00	102,046	0.0	0	0
103.50	102,046	30.0	15,307	15,307
104.50	102,046	30.0	30,614	45,921

Device	Routing	Invert	Outlet Devices
#1	Primary	97.28'	18.0" Round 18" HDPE L= 35.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 97.28' / 97.10' S= 0.0051 ' S= 0.0051 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	103.50'	4.0" Vert. Orifice/Grate X 17.00 C= 0.600

Primary OutFlow Max=3.04 cfs @ 12.45 hrs HW=103.85' (Free Discharge)

1=18" HDPE (Passes 3.04 cfs of 16.20 cfs potential flow)

2=Orifice/Grate (Orifice Controls 3.04 cfs @ 2.05 fps)

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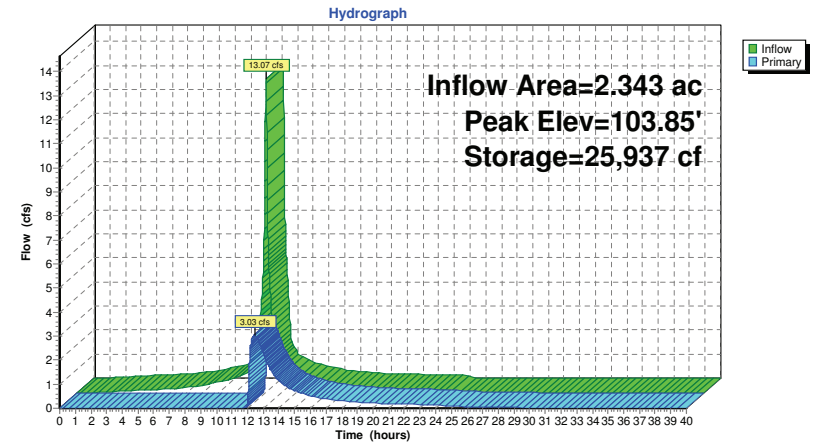
Type III 24-hr 25-Year Storm Rainfall=5.50"

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Pond 2P: Turf Field Base

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Type III 24-hr 25-Year Storm Rainfall=5.50"

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Summary for Pond 3P: CB (new)

[79] Warning: Submerged Pond 2P Primary device # 1 INLET by 1.24'

Inflow Area = 3.425 ac, 68.40% Impervious, Inflow Depth > 3.37" for 25-Year Storm event
Inflow = 5.87 cfs @ 12.13 hrs, Volume= 0.961 af
Outflow = 5.87 cfs @ 12.13 hrs, Volume= 0.961 af, Atten= 0%, Lag= 0.0 min
Primary = 5.87 cfs @ 12.13 hrs, Volume= 0.961 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 98.52' @ 12.13 hrs

Flood Elev= 103.70'

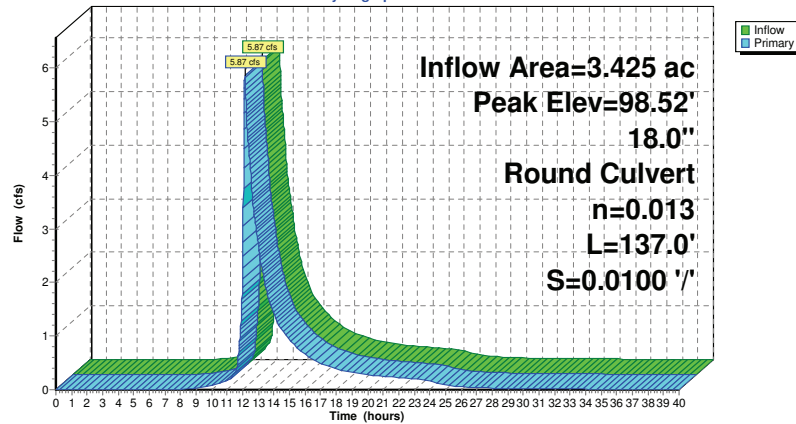
Device	Routing	Invert	Outlet Devices
#1	Primary	97.01'	18.0" Round 18" HDPE L= 137.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 97.01' / 95.64' S= 0.0100 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=5.86 cfs @ 12.13 hrs HW=98.52' (Free Discharge)

↑1=18" HDPE (Inlet Controls 5.86 cfs @ 3.31 fps)

Pond 3P: CB (new)

Hydrograph



Type III 24-hr 25-Year Storm Rainfall=5.50"

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Summary for Pond 4P: Doghouse MH (new)

[81] Warning: Exceeded Pond 1P by 0.23' @ 12.14 hrs

[79] Warning: Submerged Pond 3P Primary device # 1 OUTLET by 1.24'

Inflow Area = 4.034 ac, 61.05% Impervious, Inflow Depth > 3.41" for 25-Year Storm event
Inflow = 8.21 cfs @ 12.13 hrs, Volume= 1.146 af
Outflow = 8.21 cfs @ 12.13 hrs, Volume= 1.146 af, Atten= 0%, Lag= 0.0 min
Primary = 8.21 cfs @ 12.13 hrs, Volume= 1.146 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 96.88' @ 12.13 hrs

Flood Elev= 103.97'

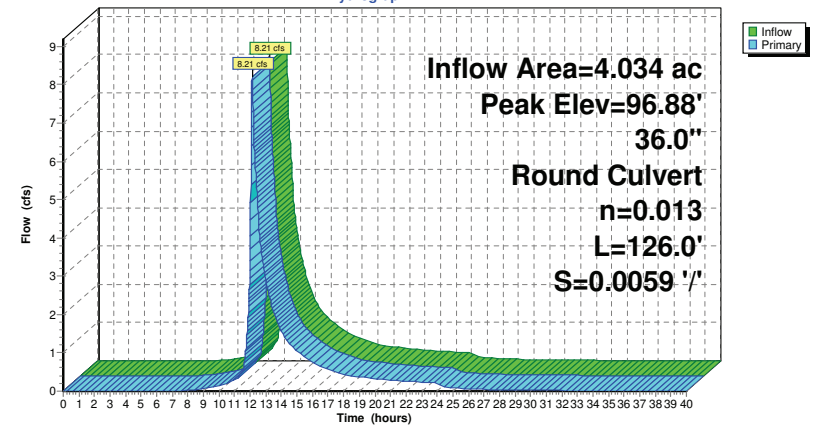
Device	Routing	Invert	Outlet Devices
#1	Primary	95.70'	36.0" Round 36" RCP L= 126.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 95.70' / 94.96' S= 0.0059 '/ Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 7.07 sf

Primary OutFlow Max=8.20 cfs @ 12.13 hrs HW=96.88' (Free Discharge)

↑1=36" RCP (Barrel Controls 8.20 cfs @ 4.68 fps)

Pond 4P: Doghouse MH (new)

Hydrograph



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Type III 24-hr 25-Year Storm Rainfall=5.50"

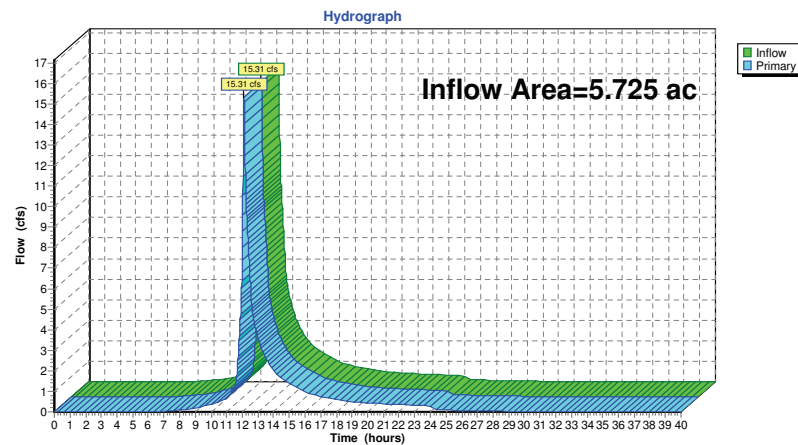
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Summary for Link DP-1: South Wetland

Inflow Area = 5.725 ac, 52.55% Impervious, Inflow Depth > 3.53" for 25-Year Storm event
 Inflow = 15.31 cfs @ 12.11 hrs, Volume= 1.686 af
 Primary = 15.31 cfs @ 12.11 hrs, Volume= 1.686 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link DP-1: South Wetland**19014_POST**

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Type III 24-hr 100-Year Storm Rainfall=6.90"

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Time span=0.00-40.00 hrs, dt=0.01 hrs, 4001 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment A: Syn Turf

Runoff Area=102,046 sf 100.00% Impervious Runoff Depth=6.66"
 Tc=5.0 min CN=98 Runoff=16.43 cfs 1.300 af

Subcatchment B: South D-Zone & S&W

Runoff Area=73,634 sf 32.24% Impervious Runoff Depth=5.16"
 Flow Length=219' Tc=6.4 min CN=85 Runoff=9.81 cfs 0.726 af

Subcatchment C: East Perimeter

Runoff Area=26,551 sf 19.75% Impervious Runoff Depth=4.93"
 Flow Length=655' Tc=8.7 min CN=83 Runoff=3.16 cfs 0.251 af

Subcatchment D: North Perimeter

Runoff Area=47,135 sf 0.00% Impervious Runoff Depth=4.49"
 Flow Length=499' Tc=7.2 min CN=79 Runoff=5.43 cfs 0.405 af

Pond 1P: YD

Peak Elev=96.76' Inflow=3.16 cfs 0.251 af
 36.0" Round Culvert n=0.013 L=55.0' S=0.0058 '/' Outflow=3.16 cfs 0.251 af

Pond 2P: Turf Field Base

Peak Elev=104.01' Storage=31,049 cf Inflow=16.43 cfs 1.300 af
 Outflow=4.21 cfs 0.942 af

Pond 3P: CB (new)

Peak Elev=99.49' Inflow=8.83 cfs 1.347 af
 18.0" Round Culvert n=0.013 L=137.0' S=0.0100 '/' Outflow=8.83 cfs 1.347 af

Pond 4P: Doghouse MH (new)

Peak Elev=97.17' Inflow=11.99 cfs 1.598 af
 36.0" Round Culvert n=0.013 L=126.0' S=0.0059 '/' Outflow=11.99 cfs 1.598 af

Link DP-1: South Wetland

Inflow=21.58 cfs 2.325 af
 Primary=21.58 cfs 2.325 af

Total Runoff Area = 5.725 ac Runoff Volume = 2.683 af Average Runoff Depth = 5.62"
47.45% Pervious = 2.717 ac 52.55% Impervious = 3.008 ac

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Type III 24-hr 100-Year Storm Rainfall=6.90"

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Summary for Subcatchment A: Syn Turf

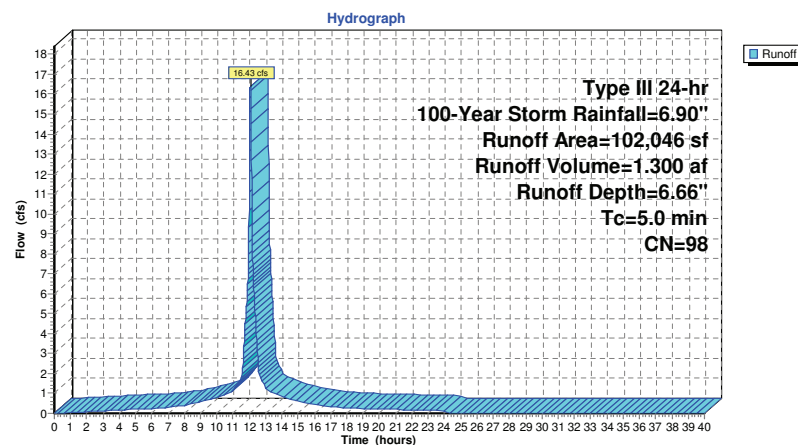
Runoff = 16.43 cfs @ 12.07 hrs, Volume= 1.300 af, Depth= 6.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.90"

Area (sf)	CN	Description
* 102,046	98	Synthetic Turf
102,046		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Min. Tc

Subcatchment A: Syn Turf



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Summary for Subcatchment B: South D-Zone & S&W Perimeter

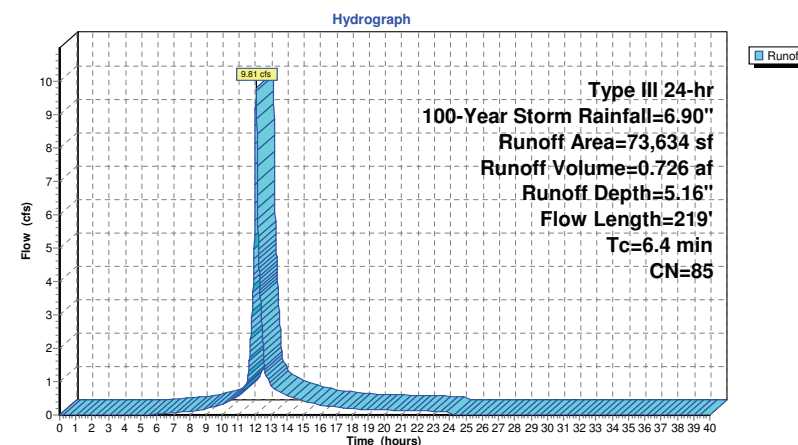
Runoff = 9.81 cfs @ 12.09 hrs, Volume= 0.726 af, Depth= 5.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.90"

Area (sf)	CN	Description
* 20,920	98	Running Track
* 403	98	Roof
* 2,419	98	Asphalt Pavement
49,892	79	50-75% Grass cover, Fair, HSG C
73,634	85	Weighted Average
49,892		67.76% Pervious Area
23,742		32.24% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.6	60	0.0290	0.18		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
0.2	32	0.0390	3.18		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.6	127	0.0420	3.30		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
6.4	219	Total			

Subcatchment B: South D-Zone & S&W Perimeter



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Summary for Subcatchment C: East Perimeter

Runoff = 3.16 cfs @ 12.12 hrs, Volume= 0.251 af, Depth= 4.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.90"

Area (sf)	CN	Description
5,244	98	Asphalt Pavement
21,307	79	50-75% Grass cover, Fair, HSG C
26,551	83	Weighted Average
21,307		80.25% Pervious Area
5,244		19.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	60	0.0230	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.20"
1.8	396	0.0050	3.72	4.57	Pipe Channel, 15" RCP 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013 Concrete pipe, bends & connections
0.2	56	0.0050	5.09	16.00	Pipe Channel, 24" RCP 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
0.5	143	0.0050	5.09	16.00	Pipe Channel, 24" RCP 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.013 Concrete pipe, bends & connections
8.7	655	Total			

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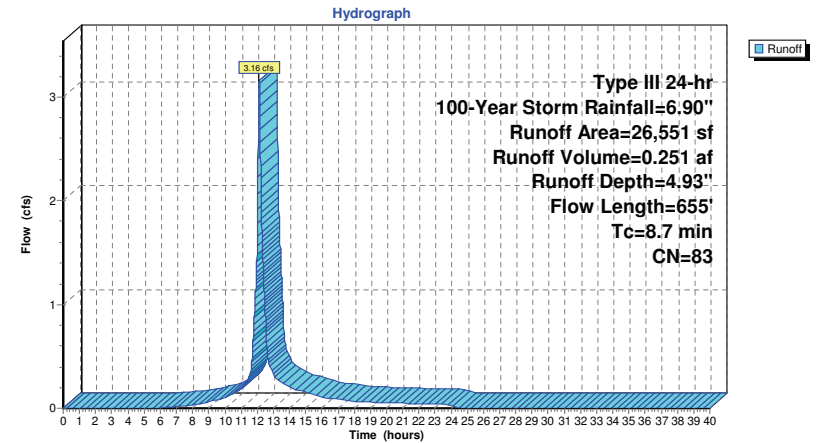
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Subcatchment C: East Perimeter



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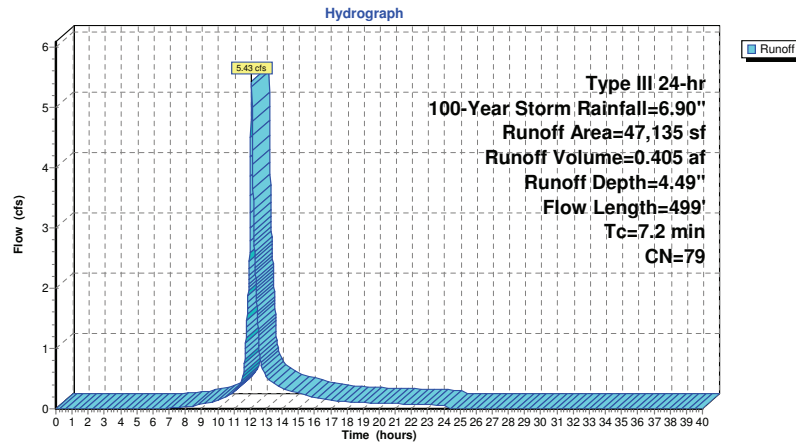
Summary for Subcatchment D: North Perimeter

Runoff = 5.43 cfs @ 12.10 hrs, Volume= 0.405 af, Depth= 4.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Storm Rainfall=6.90"

Area (sf)	CN	Description
47,135	79	50-75% Grass cover, Fair, HSG C
47,135		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	60	0.0300	0.18		Sheet Flow , Grass: Short n= 0.150 P2= 3.20"
1.6	404	0.0050	4.20	7.43	Pipe Channel, 18" HDPE Collector Pipe 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior
0.1	35	0.0050	4.20	7.43	Pipe Channel, 18" HDPE 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.013 Corrugated PE, smooth interior
7.2	499	Total			

Subcatchment D: North Perimeter**19014_POST**

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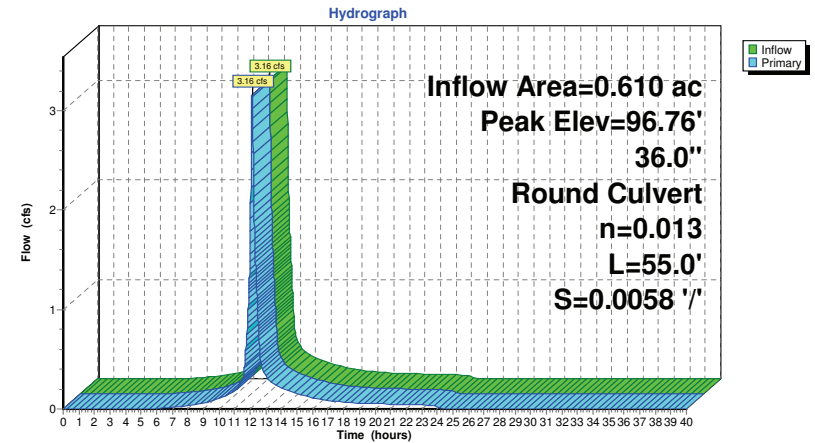
Type III 24-hr 100-Year Storm Rainfall=6.90"

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Summary for Pond 1P: YDInflow Area = 0.610 ac, 19.75% Impervious, Inflow Depth = 4.93" for 100-Year Storm event
Inflow = 3.16 cfs @ 12.12 hrs, Volume= 0.251 af
Outflow = 3.16 cfs @ 12.12 hrs, Volume= 0.251 af, Atten= 0%, Lag= 0.0 min
Primary = 3.16 cfs @ 12.12 hrs, Volume= 0.251 afRouting by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
Peak Elev= 96.76' @ 12.12 hrs
Flood Elev= 103.97'

Device	Routing	Invert	Outlet Devices
#1	Primary	96.02'	36.0" Round 36" RCP L= 55.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 96.02' / 95.70' S= 0.0058 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 7.07 sf

Primary OutFlow Max=3.15 cfs @ 12.12 hrs HW=96.76' (Free Discharge)
1=36" RCP (Barrel Controls 3.15 cfs @ 3.50 fps)**Pond 1P: YD**

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Type III 24-hr 100-Year Storm Rainfall=6.90"

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Summary for Pond 2P: Turf Field Base

Inflow Area = 2.343 ac, 100.00% Impervious, Inflow Depth = 6.66" for 100-Year Storm event
 Inflow = 16.43 cfs @ 12.07 hrs, Volume= 1.300 af
 Outflow = 4.21 cfs @ 12.42 hrs, Volume= 0.942 af, Atten= 74%, Lag= 20.9 min
 Primary = 4.21 cfs @ 12.42 hrs, Volume= 0.942 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs
 Peak Elev= 104.01' @ 12.42 hrs Surf.Area= 102,046 sf Storage= 31,049 cf

Plug-Flow detention time= 259.0 min calculated for 0.942 af (72% of inflow)
 Center-of-Mass det. time= 166.9 min (909.1 - 742.2)

Volume	Invert	Avail.Storage	Storage Description	
#1	103.00'	45,921 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
103.00	102,046	0.0	0	0
103.50	102,046	30.0	15,307	15,307
104.50	102,046	30.0	30,614	45,921

Device	Routing	Invert	Outlet Devices
#1	Primary	97.28'	18.0" Round 18" HDPE L= 35.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 97.28' / 97.10' S= 0.0051 ' S= 0.0051 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Device 1	103.50'	4.0" Vert. Orifice/Grate X 17.00 C= 0.600

Primary OutFlow Max=4.21 cfs @ 12.42 hrs HW=104.01' (Free Discharge)

1=18" HDPE (Passes 4.21 cfs of 16.43 cfs potential flow)

2=Orifice/Grate (Orifice Controls 4.21 cfs @ 2.84 fps)

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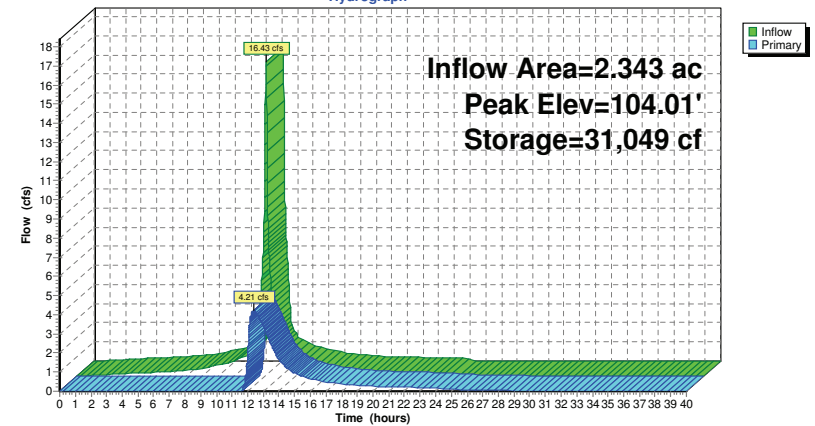
Type III 24-hr 100-Year Storm Rainfall=6.90"

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Pond 2P: Turf Field Base

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Type III 24-hr 100-Year Storm Rainfall=6.90"

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Summary for Pond 3P: CB (new)

[79] Warning: Submerged Pond 2P Primary device # 1 INLET by 2.21'

Inflow Area = 3.425 ac, 68.40% Impervious, Inflow Depth > 4.72" for 100-Year Storm event
 Inflow = 8.83 cfs @ 12.12 hrs, Volume= 1.347 af
 Outflow = 8.83 cfs @ 12.12 hrs, Volume= 1.347 af, Atten= 0%, Lag= 0.0 min
 Primary = 8.83 cfs @ 12.12 hrs, Volume= 1.347 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 99.49' @ 12.12 hrs

Flood Elev= 103.70'

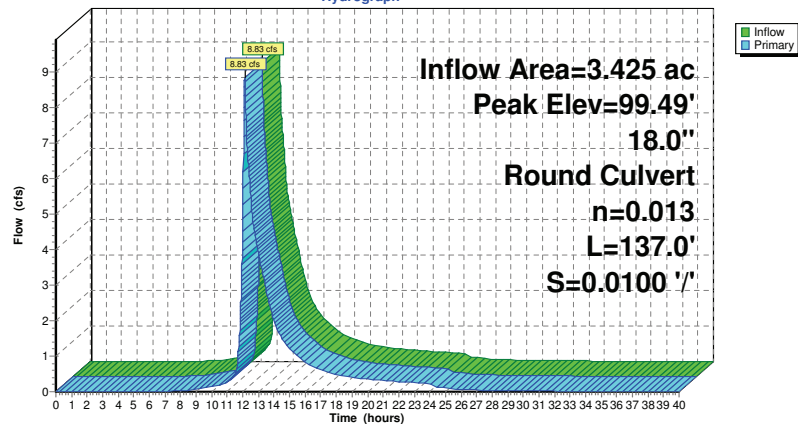
Device	Routing	Invert	Outlet Devices
#1	Primary	97.01'	18.0" Round 18" HDPE L= 137.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 97.01' / 95.64' S= 0.0100 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=8.82 cfs @ 12.12 hrs HW=99.49' (Free Discharge)

↑1=18" HDPE (Inlet Controls 8.82 cfs @ 4.99 fps)

Pond 3P: CB (new)

Hydrograph

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Summary for Pond 4P: Doghouse MH (new)

[81] Warning: Exceeded Pond 1P by 0.40' @ 12.11 hrs

[79] Warning: Submerged Pond 3P Primary device # 1 INLET by 0.15'

Inflow Area = 4.034 ac, 61.05% Impervious, Inflow Depth > 4.75" for 100-Year Storm event
 Inflow = 11.99 cfs @ 12.12 hrs, Volume= 1.598 af
 Outflow = 11.99 cfs @ 12.12 hrs, Volume= 1.598 af, Atten= 0%, Lag= 0.0 min
 Primary = 11.99 cfs @ 12.12 hrs, Volume= 1.598 af

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Peak Elev= 97.17' @ 12.12 hrs

Flood Elev= 103.97'

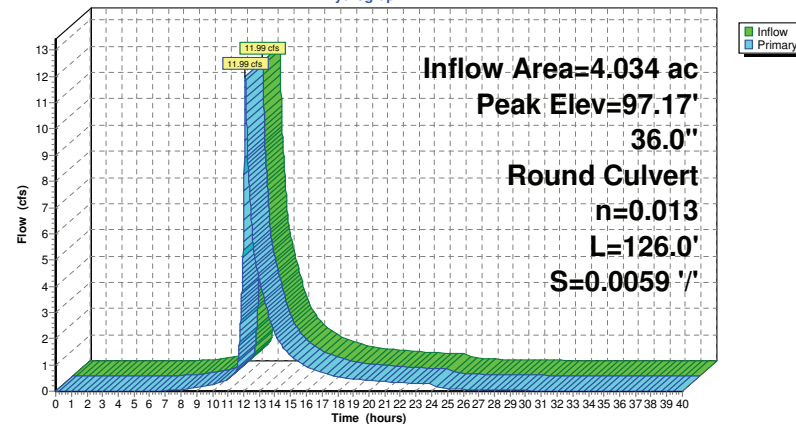
Device	Routing	Invert	Outlet Devices
#1	Primary	95.70'	36.0" Round 36" RCP L= 126.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 95.70' / 94.96' S= 0.0059 '/ Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 7.07 sf

Primary OutFlow Max=11.97 cfs @ 12.12 hrs HW=97.16' (Free Discharge)

↑1=36" RCP (Barrel Controls 11.97 cfs @ 5.11 fps)

Pond 4P: Doghouse MH (new)

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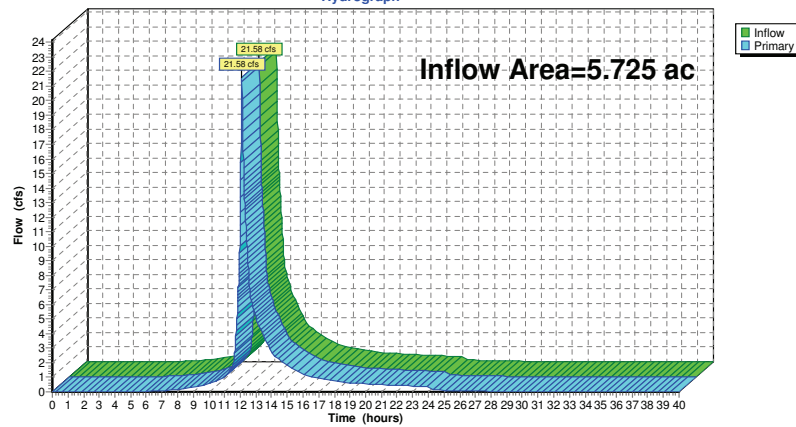
Summary for Link DP-1: South Wetland

Inflow Area = 5.725 ac, 52.55% Impervious, Inflow Depth > 4.87" for 100-Year Storm event
Inflow = 21.58 cfs @ 12.10 hrs, Volume= 2.325 af
Primary = 21.58 cfs @ 12.10 hrs, Volume= 2.325 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.01 hrs

Link DP-1: South Wetland

Hydrograph



CONTENTS:

1. Stormwater Maintenance Narrative
2. Stormwater Maintenance Log



STORMWATER FACILITIES INSPECTION AND MAINTENANCE PLAN

University of Saint Joseph – Athletic Field Renovations

During construction activities, the maintenance of all stormwater measures will be the direct responsibility of the Contractor undertaking the work. All work shall conform to the terms and conditions of all relevant local, State and/or federal permits. After acceptance by the Owner, the maintenance of all stormwater management facilities, the establishment of any contract services required to implement the program, and the keeping of records and maintenance log book will be the responsibility of the University. Notwithstanding any other schedule noted below, general inspections should be conducted by facilities staff monthly, during, or immediately following rainfall events so that the function of the systems can be suitably observed.

Ditches and Swales

Open swales and ditches shall be inspected at a minimum on a quarterly basis, and before and after a major rainfall event to assure that debris and/or sediments do not reduce the effectiveness of the system. Debris noticed during an inspection shall be removed at that time, or within 24-hours of the inspection. Any sign of erosion or blockage shall be immediately repaired and stabilized to ensure the stability of the structure and proper function. Maintenance shall include, but not be limited to, mowing, trimming and removal vegetation in the ditches as required to prevent vegetation from blocking or diverting storm flows, removing vegetation and debris from the culverts, inlet and outlet structures.

Drainage Pipes and Culverts

Culverts and piped drainage systems shall be inspected on an annual basis to remove any obstructions to flow; remove accumulated sediments and debris at the inlet, at the outlet, and within the conduit; and to repair any erosion damage at the pipe inlet and outlet. Sediment should be removed when its level exceeds 20% of the pipe diameter. This may be accomplished by hydraulic flushing or any mechanical means; however, care should be taken to contain the sediment at the pipe outlet, and not flush the sediments into the wetland areas.

Inlet and Outlet Grates

Inlet and outlet grates are intended to trap and control floatables and debris within the stormwater system. The grates should be inspected on a quarterly basis, and after large storm events for build up of debris and other potentially detrimental material. Periodic maintenance of these features will be required to keep grates clear and prevent damage to either the grate itself or the attached structure.

Catch Basins

Inspect catch basins at least four times a year, and at the end of foliage and snow removal seasons. Remove sediments from catch basin at least four times per year or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin. (Removal of sediments shall occur a minimum of once per year). Clean out must include the removal and legal disposal of accumulated sediments and debris at the bottom of the basin, at any inlet grates, at any inflow channels to the basin, and at any pipes between basins.

Stormwater Inspection and Maintenance Log

Site Name: University of Saint Joseph

Location: West Hartford, CT

Date of Inspection:

BMP	Quarterly Inspection tasks	Completed	Notes	Maintenance Required	Maintenance Complete
Slopes	Check for signs of erosion				
	Check for settlement/slumping				
Paved Areas	Check for sand build-up				
	Check edges for displacement/failure				
Catch Basins	Check sediment levels in sumps				
	Check grates				
	Check for debris/litter				
Culverts	Inspect structural integrity				
	Look for joint displacement				
	Inspect inlet and outlet structures				
	Check for sediment accumulation				